FOOD ENGINEERING

May 1952

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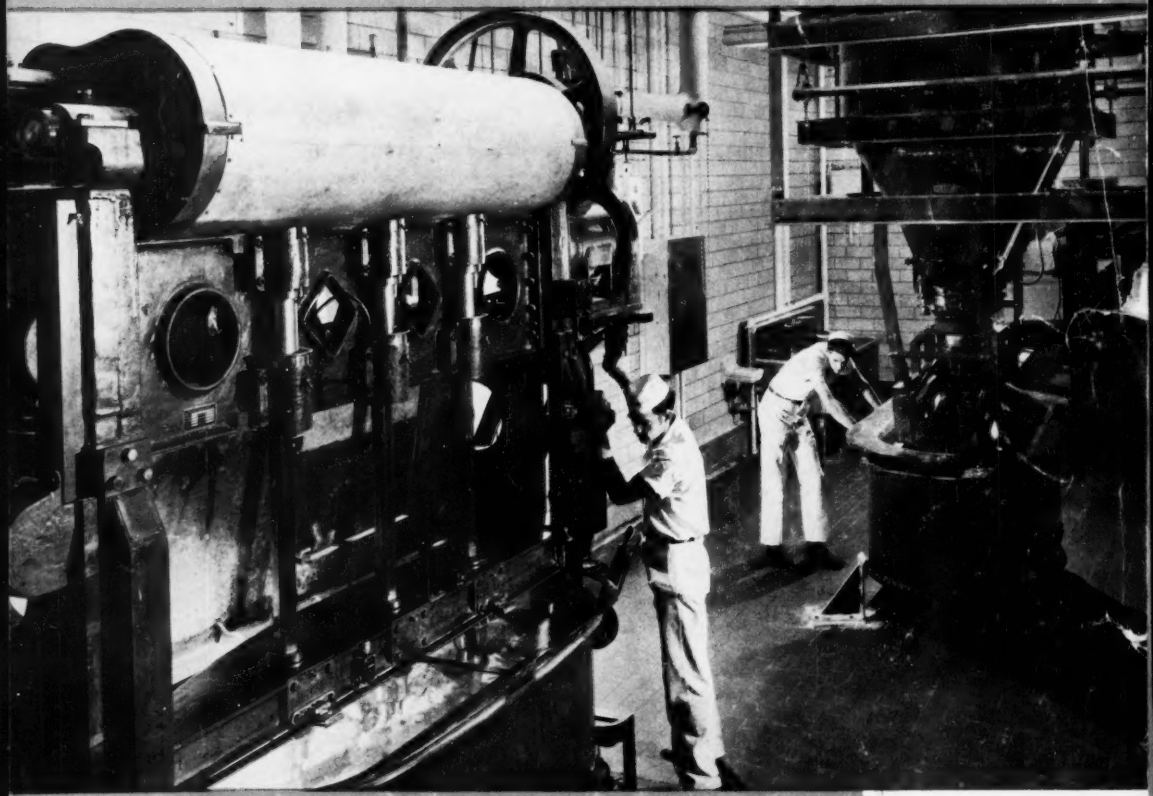

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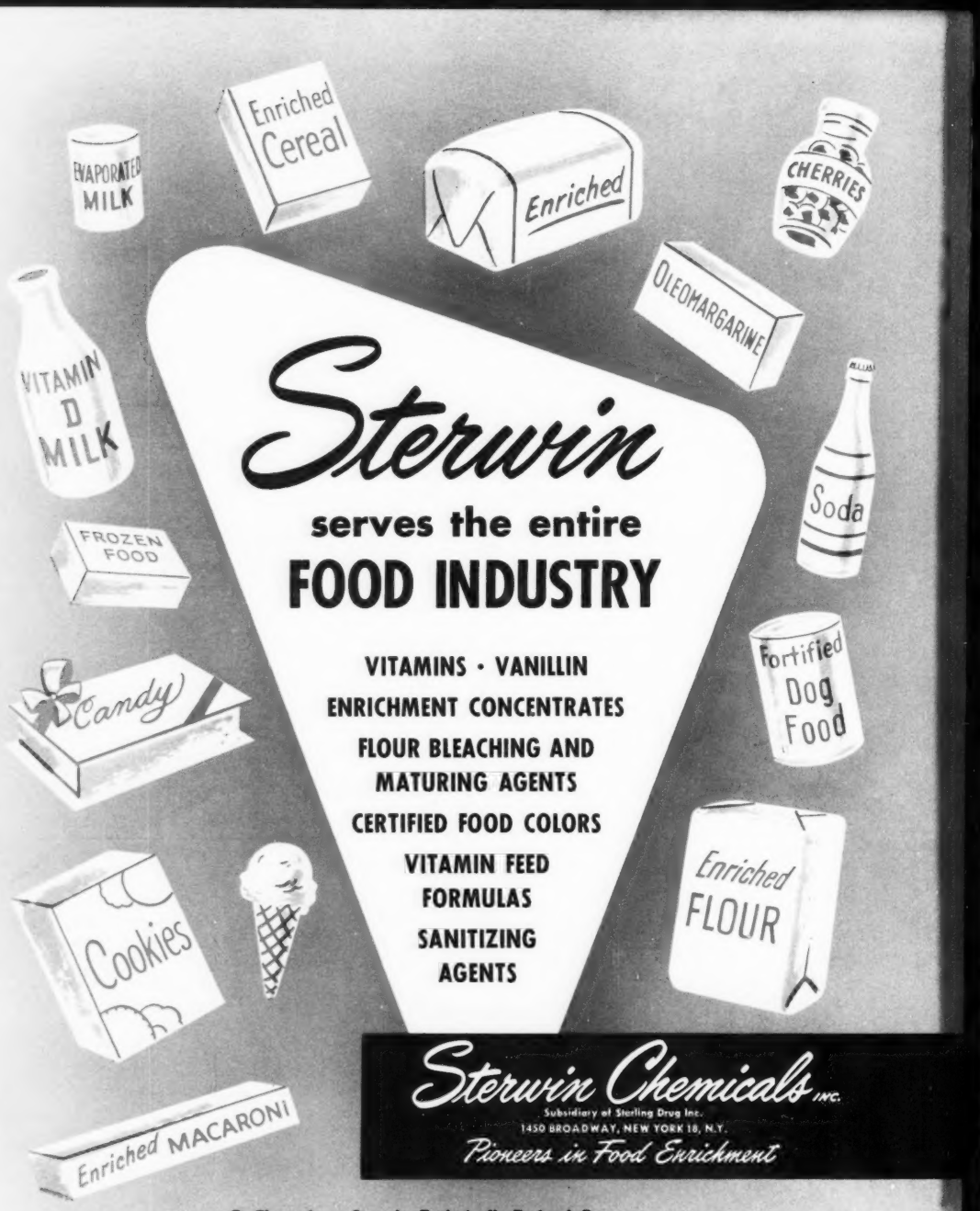

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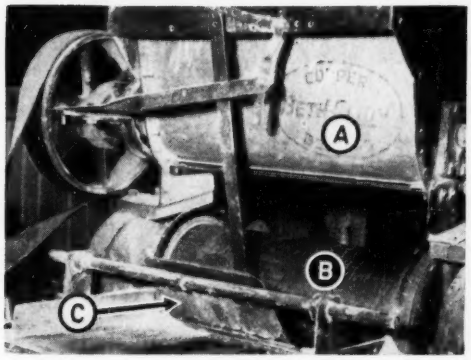
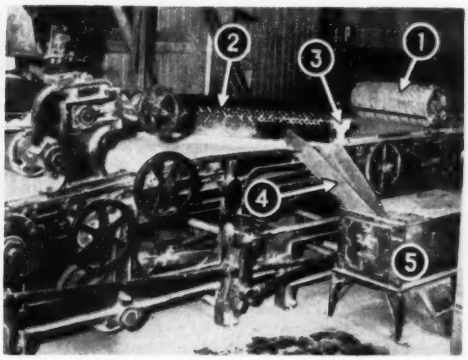
PRACTICAL IDEAS





Two "Twists" That Prevent Flour Waste

Since making two simple changes on our machine that rolls dough from thick slabs into a wide ribbon, we have avoided the former waste of several hundred sacks of flour per year.

This is how the machine operates and how the profitable changes were made:

From the hopper—(A) in left photo—flour is continuously sprinkled on the roller (B). Thus, dough flattened between the rolls is prevented from sticking to them. However, the feed of dough is intermittent, and no provision had been made to halt the sprinkling of flour when the flow of dough ceased. Result was a considerable waste of flour—until we fashioned a simple control on the hopper discharge.

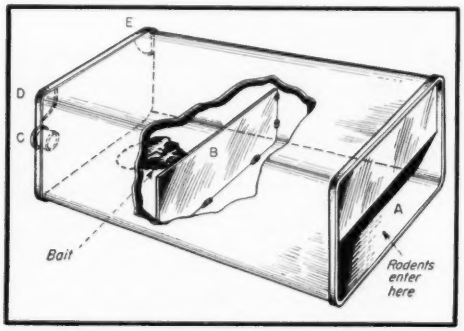
Now, a heavy plate (C) rests on the dough, as near as possible to the point where the latter passes between the rolls. When the end of the slab of dough is about to pass between the rolls, the plate drops, operating the lever-arms above to disengage the flour-feed clutch.

This ended one source of flour loss. But there was still another to be eliminated:

Since it is necessary to remove the flour from the surface of the rolled-out dough before it reaches the indenter roll—(1) in right photo—a rotary brush (2) is placed horizontal to the dough travel. But though the dough surface was thoroughly swept by this method, flour piled up in front of the brush and spilled over the sides of the machine onto the floor—later to be swept up and discarded.

To solve this problem, we angled the brush at 45 deg., using a pipe-T (3) as a bearing and a nipple as support. Thus, flour is now continuously carried to one discharge point, where it empties into a chute (4), for delivery to a small separator-cleaner (5).

From the latter, lump-free flour is returned by elevator and chute to the flour hopper for re-use.—*Herbert D. Bahrenburg, Plant Engineer, Maltex Co., Burlington, Vt.*



Efficient Rodent-Poisoning Box

Efficient contrivances in which rodent poison can be "planted" were easily made at our plant from discarded, oblong, gallon-capacity cans.

This is how they were constructed:

When the size can which measures 9¾ in. by 6⅝ in. by 4⅛ in. is chosen, first cut away one half of the can bottom —(A) in sketch—using can opener and tin snips.

Then take the section removed and solder it inside the can to form a central barrier as shown at (B). The compartment thus formed (left of barrier in sketch) is the section in which the poison rodent-food selected for the job is placed.

If the can is the type with a screw cap (C), the closure may be removed to provide ventilation, which aids in spreading the odor of the bait. If the container is not the screw-cap type, upper corners, (D) and (E), may be cut from the can for this purpose.

This type poison-bait container has five prime advantages:

1. It is safe for the unknowing who might pry. For though mice and rats find no difficulty reaching the bait, the small opening and barrier make it too difficult for hands to get in, or other animals that might be lured by the poisoned food.

2. It is easily made and inexpensive.

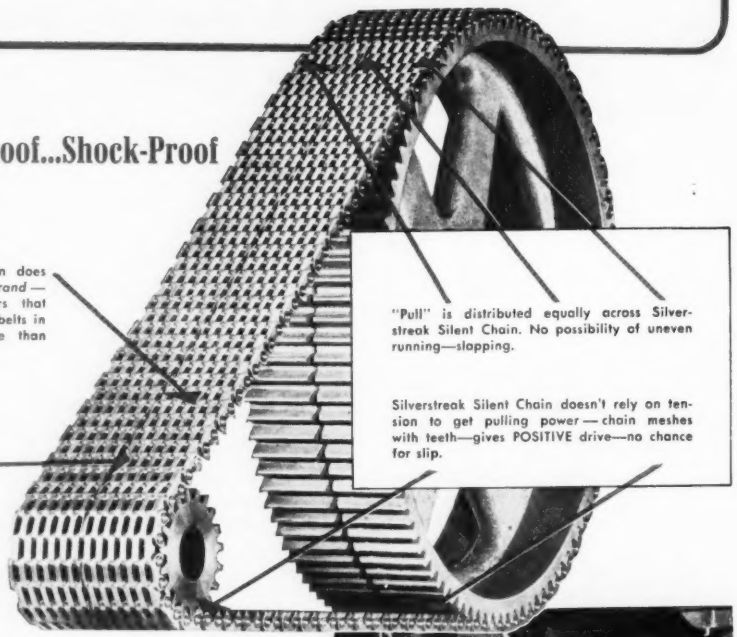
3. Container is durable and protects bait from rain when placed in the open.

4. It is easily baited, also readily cleaned, by hosing with water or steam.

5. Its small size permits locating it in narrow rodent runs. And when made from a ½-gal. can, it can be placed between pallets in warehouses.—*Paul E. Laughlin, Sanitarian, Dried Fruit Assn. of California, San Francisco.*

High-speed, high-hp power transmission is an old story for Silverstreak Silent Chain Drives

Slip-Proof...Slap-Proof...Shock-Proof



Silverstreak Silent Chain does the job with a *single strand* — eliminating the dangers that come with one or more belts in a group carrying more than their share of the load.

"Pull" is distributed equally across Silverstreak Silent Chain. No possibility of uneven running—slapping.

Silverstreak Silent Chain doesn't rely on tension to get pulling power — chain meshes with teeth—gives POSITIVE drive—no chance for slip.

Husky Silverstreak *metal link* construction combines the ability to carry heavy overloads with the resilience that really absorbs shock.

YES, for many years Link-Belt Silverstreak Silent Chain has been the accepted solution for the toughest transmission problems. These time-proven drives stand up under long years of high-speed, high-hp service . . . maintain their efficiency (over 98%) with virtually no attention.

Check the Silverstreak advantages shown here. See for yourself why so many concerns that must combine top transmission efficiency with unfailing dependability—standardize on Link-Belt Silverstreak Silent Chain Drives.

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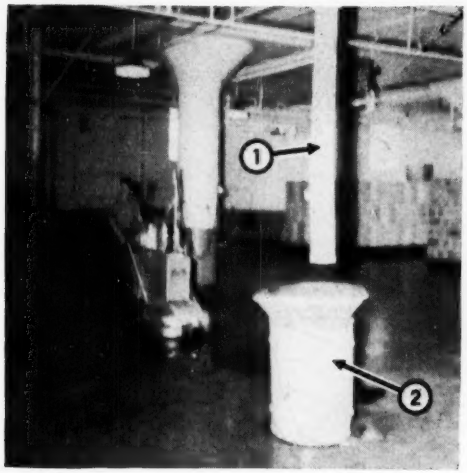
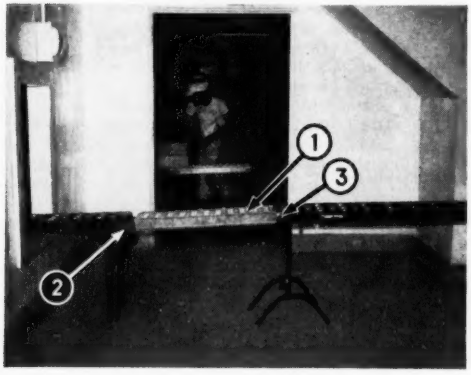


Pipe Zips Hazardous Glass Off Floor

By cutting a hole in the floor of its bottling room and installing an 8-in. pipe to the floor below, Dr. Pepper Bottling Co., Dallas, Tex., has provided a means of quickly removing from the room all fragments of broken bottles.

In high-speed operations particularly, all particles of glass from broken bottles must be immediately cleaned from machines to permit renewed operation. Before the hole was cut and pipe inserted, the accumulation of shattered bottles on the floor constituted a major accident hazard.

Now, bottle fragments are immediately swept to the hole, to discharge down the pipe—(1) in photo—and into a 55 gal. metal drum (2) resting on the floor below. Drum is picked up periodically by motorized truck as a part of the refuse disposal routine.—*FE Staff.*



Conveyor "Links" Permit Aisle Traffic

Installation of short lengths of hinged conveyor sections where conveyor lines cross aisles and passageways permits use of both as necessary.

At a number of locations in our plant, case conveyors cross aisles and passageways enroute to loading docks or temporary refrigerated storage rooms. Hence, the conveyor "crossings" couldn't be permanent, for then trucks couldn't use the aisles and foot traffic would be difficult, if not dangerous.

By installing short, hinged conveyor sections—(1) in photo—over aisles, the latter can be quickly opened to truck or foot traffic merely by swinging the short conveyors up and back on their hinges (2). Movement of case-goods is thus interrupted only momentarily. For the conveyor section is readily lowered back into place. Hooks (3) fit over bolts extending from the main conveyor to lock-in the section—*Stokes Homan, Poultry Technologist, Armour and Company, Salisbury, Md.*

Salt Removes Floor-Ice Hazard

Defrosting of refrigerated coils in our frozen food warehouse periodiocally created an accident hazard. But a new method solved the problem.

Formerly, after draining of the refrigerant from the pipes, hot gas from the compressors was circulated through the lines. Then heat of the gas melted the snow until it dropped from the coils.

By the time the snow was accumulated in piles on the floor, part of it had turned to slush, which quickly formed into a coating of ice. As an ever-present accident menace, the ice had to be removed. And chipping it loose after the snow had been swept out consumed time and manual effort. What's more, our floors were often chipped as well as the ice.

Now, salt is scattered over the floor before defrosting starts. Hence, snow from the coils does not freeze when it falls to the floor. Most of it can be shoveled in trucks and carted away. That which melts, stays liquid and is removed by squeegee and mop.

Since using this method, defrosting time has been lessened, and bad slips on icy floors are avoided.—*L. W. Johnson, Warehouse Supervisor, John H. Dulany & Sons, Inc., Exmore, Va.*

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Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

MARCH PRACTICAL IDEA voted best was "Accurate Home-Made Metering Pump." Submitted by Aloys L. Tappel, University of California, Davis, Calif., it told how to build a simple wheel-and-roller unit to give a peristaltic-like squeezing action in flexible tubing to carry liquids forward in specific amounts.

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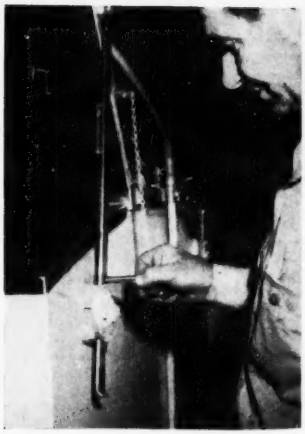

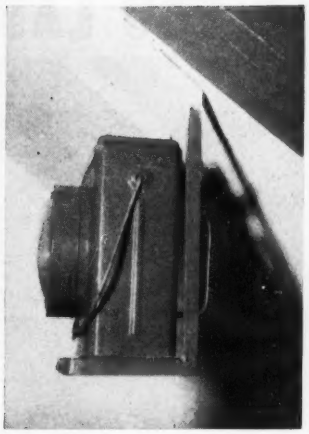

Safety on Lids, Grinders, and Lighting

Too often, food plants accident hazards are not removed —or for that matter even recognized—until an injury occurs. Closing the door too late may save the rest of the horses, but not the first.

The following three safety suggestions are aimed at preventing the first as well as following accidents.

Prevent That Lid From Falling

First is the device installed to make it impossible for the heavy lid of a milk cooler to fall unexpectedly and injure someone. The attachment assuring safety is readily procured, easy to install, and inexpensive. Here's how it is made:

Onto the lid in question, a stainless steel supporting metal bar is attached so as to pivot (first photo). Then, below the pivot point (lid closed) a device containing a pair of toggles is fitted to the side of the cooler, so located that the support bar can pass between the grippers. Further, trips are welded on the inner surface of the bar to engage the toggles—being set to hold the lid securely in a raised position, and resetting as the lid is closed.

However, since lowering the lid was accomplished by first lifting, to disengage the toggles, a hazard remained. A worker could unknowingly push up on the lid, thus releasing the safety support.

But removing this hazard was not complicated. Just above the point of engagement by the toggle, when the lid is lifted, a key-hole slot was made in the bar. Then a rod was fashioned, like a skeleton key, to fit into the hole-and-slot in the bar.

By means of a counterbalance, this key rod, after insertion in the bar slot, is made to swing so that the projection on the key rod slides beyond the slot opening. The key, which now cannot fall out of the hole in the supporting bar, can only be removed manually by turning before pulling out.

Provisions were also made to prevent the key from going astray. It is attached to the side of the cooler, conveniently near the safety support, by a heavy chain. Only gross negligence can now be responsible for an accident.

No Light, No Grinding

A necessary part of most food plants is the repair shop, where many minor accidents may occur—for instance injury in use of the grinders.

Here, dangers can be lessened by taking two precautions: First, good lighting, since when grinders are used in insufficient light, probability of injury is greater.

To prevent workers taking a chance when there is too little light, locate the grinding wheels in the darkest section of the shop. Then, wire the electric lamp for the grinder (second photo) into the circuit with the motor—in series. Thus, the grinder can only be used when the lamp is lighted. Be sure the bulb has ample wattage.

Well known, too, is the danger of eye injury from grinding wheels. The best protective measure—goggles—is equally known. But eye injuries from grinders still occur because workers fail to don protective glasses.

Here is a way not only to encourage the wearing of goggles, but also to make the failure to wear them an intentional act: Replace the switch controlling the motor and light by a 3-4 in. lever switch raised by a spring and lowered by weighing down its curved end. Install this electric control so that the circuit is open when the lever is down and closed by the tension of the spring when the weight on the lever is removed.

Now, use a pair of goggles as the weight that opens the circuit. With this arrangement, goggles must be lifted from the control lever to start the grinder motor. And it is stopped and the light turned off by replacing the goggles on the switch lever.

Emergency Light When Current Fails

When lights go out due to a blown fuse or because of power failure outside, that is the time to anticipate trouble —injuries to people and damage to equipment. Then, many things must be done quickly. And in sudden darkness, there is sure to be fumbling about, and fumbling is never safe.

If electric lanterns (third photo) are located in accessible areas throughout the plant, the confusion caused by the sudden blackness can quickly be dispelled. Those employees who have key responsibility when power fails will familiarize themselves with flash-light locations, so that when current fails, the lanterns are immediately on the job.

If emergency flash-lighting is adopted in a plant, each light should have a special rack (as that seen in photo) so it is always in place.

Another precaution should be taken; Remove glass lenses from all lights and replace them with lenses made of plastic. A glass lens broken in the confusion might be serious.

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Your labeled products are competing with thousands of others for the buyer's attention. Is their outward appearance worthy of the contents? Send for this Round Container Labeling Bulletin, profusely illustrated, that tells you how to achieve clean, neatly labeled, salable containers at low cost. We tell you all about modern can labeling methods, and describe the machines available on the market today to give you top efficiency in your labeling department.

Learn all about the many Paisley scientifically designed Cold and Hot Pickup Gums, Lap Pastes and Spot Labeling Adhesives that can be useful to you right now. Be prepared to meet the competition in your industry with the help of Paisley Round Container Labeling Adhesives. Send for your copy today.

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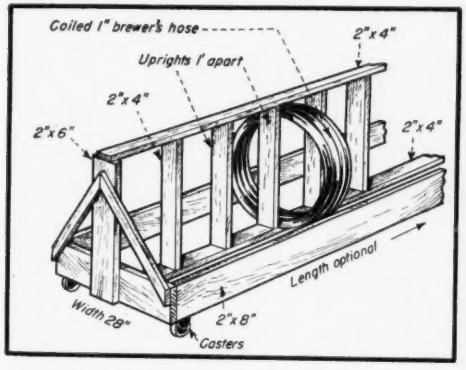
To make plastic lenses at small cost, first turn out of wood on your shop lathe a male and female die of the general size and shape of the removed glass lenses. Now, cut sheet plastic circles about ½ in. greater in diameter than the glass lenses, and soak these in hot water. Softened by the heat, pastic disks will conform to the shape of the dies with little pressure. When set, they can be cut and filed to fit the lanterns.—*FE Staff.*



Mobile Hose-Rack Real Asset

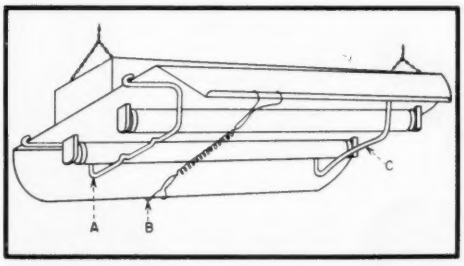
Mounted on casters and fabricated with common lumber, this hose-rack we constructed in our plant has paid for itself many times in savings on hose purchases.

Formerly, in our winery, the expensive type of brewer's hose in which wine is transported was left lying on the floor, whether in use or not.

Now, coiling the hose in the rack as soon as pumping operations are completed not only protects the hose, and thereby greatly extends its working life, but also facilitates transporting it safely where it is needed next.

Furthermore, the storage unit removes a very real accident hazard, by removing hose from floors, where they were a trip-menace.

The mobile unit shown in the accompanying sketch was designed for six 50-ft. lengths of 1-in. hose. Carrier construction can be varied according to size, length, and number of units of hose.—*Alexander Frustaci, Peerless Wine Corp., So. Portland, Me.*



To Keep Light Tubes From Falling

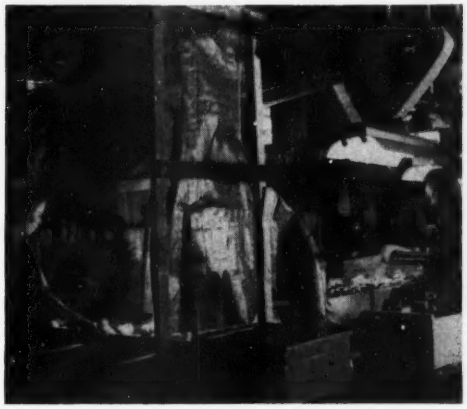
Three home-made, simply constructed devices will remove the hazard of falling fluorescent lights. When a loosened tube crashes to the floor or on to food plant equipment, the results may be very serious—splintered glass may fly into the product, and workmen may be injured. At best, a vigilant cleanup is required.

Here's how to prevent tubes from falling:

1. If the fixture is open-ended, a clamp—(A) in sketch—can be formed to fit onto the end at the top of the cover and extend under the lights to make a permanent support.

2. If the fixture is of the close-end type, two wire clamps (B) fitted over the lower edges of the cover and held in place by a wire spring will prevent tubes from dropping. An alternate for this type holder is a thin strip of metal (C) attached by bolts, or otherwise, to the inside of the cover and under the tubes.

3. Plastic tubing, of diameter greater than tube or socket, can be cut and fitted over the union of the two to provide security.—*J. Robinson, Van Camp Sea Food Co., Inc.*



U-V Lamp Detects Fruit Blemishes

Through experiments with selected ultra-violet rays, we were able to choose a lamp, in the light of which blemished areas on fruit appeared fluorescent. Skins of healthy fruit appeared unchanged.

Finding and removing damaged fruit thus became an easily performed, yet accurate inspection routine. Skin blisters and brown rot, even in earliest stages, were immediately apparent.

Here is the procedure: An emergency dark room (photo) made of sheathing and heavy paper was constructed over an assembly line conveyor just preceding the washing and waxing operation. In this compartment, a Model XX-40, "Blak-Ray" long wave ultra-violet light was installed.

This method proved so satisfactory that similar installations are being made in all our company plants.—*J. R. MacRill and W. C. Waid, Field Department Laboratory, Sunkist Orange Growers Assn., Upland, Calif.*

No-Frost Door Numbers

It is a simple matter to prevent numbers on cold-storage doors from frosting over and thus becoming illegible. Just paint numbers in red on a board painted white, then separate the board from the door by placing two short pieces of wood the thickness of lath between door and numbered board. With this ventilation, the surface on which the numbers are painted stays dry and unfrosted.—*Refrigeration Research Foundation "Information Bulletin."*

The Protection of Century Type TEFC* Motors Keeps Production Rolling

T Totally Enclosed Fan Cooled Motors*

- Smooth exterior surface — easy to clean.
- Cast iron frame resists rust and corrosion.
- Rugged construction — resists hard knocks and rough handling.
- Integral cast iron rabbet surrounds shaft opening at the point where processed material may contact the motor.

Your Maintenance Man.. who must keep your Production Turning, knows how to evaluate the inside of the Motor. Ask him about these Century Construction features.

Century type TEFC protected type motors are very popular in the chemical and food processing industries for resisting rust and corrosive fumes. They are widely used in the metal working industries to protect the vital parts against abrasive dust or gritty oil fog.

Specify Century motors on the motorized equipment you purchase, or call a Century branch office or a Century distributor when you purchase motors. Century manufactures a complete line from ½ to 400 H. P.

- Vital parts of motor protected — sealed-in inner frame.
- Reverse direction of motor without changing fan — Fan runs in either direction.

- Uniform ventilation — surrounding outside of inner frame.
- Smooth straight-through ventilating passages.
- Winding electrically insulated 6 different ways.

- Uniform rotor winding — high pressure cast aluminum.
- Ball bearing housing keeps grease "in"—dirt "out"—lubricated for several years' normal service, with grease plugs when you want to lubricate bearings.

- Easy to remove fan guard for inspection—2 screws hold steel fan guard in place.

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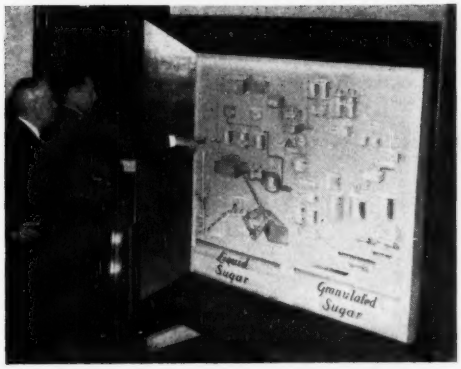
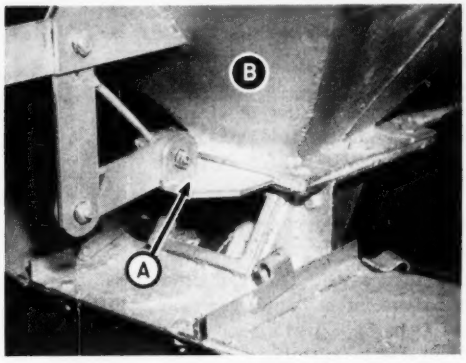
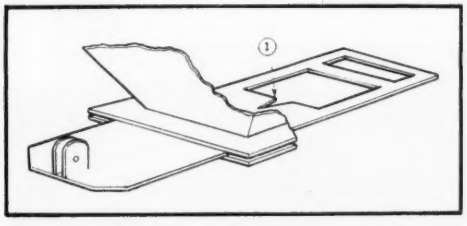


Flow Diagram Promotes Understanding

A graphic-type flowsheet installed in the main lobby of our plant explains and clarifies, for those who visit our sugar refinery, "what they will see, and later what they have seen."

This easily interpreted diagram has proved most helpful, conserving our time and promoting understanding for engineers and technicians as well as laymen who visit our plant.—*P. X. Hoymak, General Sales Manager, Refined Syrups & Sugars Inc., Yonkers, N. Y.*





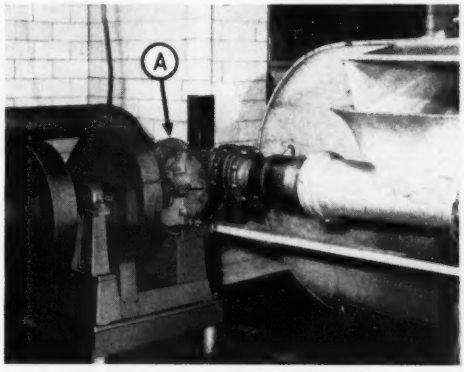
Notched Slide Valve Ends Clogging

By merely cutting a V-notch in the side valve—(A) in photo—which controls the flow of bulk sugar from the storage hopper (B) into a screw conveyor, we have avoided an irregular flow of the product.

Formerly, the opening in the slide valve was a rectangle with straight-line edges. And since the entire travel of the sugar from the bins to the processing area (a distance of more than 150 ft. to a height of 20 ft. or more) is by screw conveyor, the flow from the bin had to be controlled to prevent conveyor overloading.

When the straight-edged slide was opened just sufficient for the optimum flow, the slit was narrow enough to be clogged by lumps of sugar. And even though such lumps are small and infrequent, the flow from the slot gradually diminished—meaning insufficient supply to the processing areas.

When a V-notch—(1) in sketch—was cut in the slide, the flow could still be controlled to the desired amount, yet the opening was now large enough to prevent clogging by small lumps. Hence, conveyor operation is no longer interrupted, and supply to the processing lines is now steady and adequate.—*D. B. Bradshaw, Plant Engineer, A. H. Johnson Co., Boston.*



One Pump Replaces Eight Men

A heavy-duty rotary pump, installed in a midwest packing company's plant now transports fat from a meat grinder to lard rendering tanks—an operation which formerly required the labor of eight men.

For years, ground fat was collected at this plant in metal hoppers, which when filled were first pushed by hand labor along aisles, then lifted up three floors by elevator, and finally dumped into the rendering kettles.

Hand trucking the fat required use of valuable floor space, necessitated both truck and floor maintenance, and tied up the elevators. To eliminate such operations, a pump was installed to lift the fat up the three floors and deliver it directly.

However, it was soon obvious that only a special type pump could function satisfactorily. Therefore, the initial pump employed was replaced by a heavy-duty rotary Viking pump—(A) in photo.

During the several years this pump has been in use it has regularly transported ground fat to the tanks, 17 hr. per day, economically and satisfactorily, without interruption, and with no repairs to the pump.

Of opposite-port construction, this pump receives 12,000 lb. of fat per hour directly from the grinder, lifts it the three stories through 6-in. pipe, and feeds it into the rendering tanks. Right angle turns and horizontal travel are negotiated by the pump without pulsation or loss of efficiency.

Operating costs (confined to the current supplied to a 7½ hp. motor) is low, trucks and their labor have been eliminated, and rendering time has been reduced. —*FE Staff.*

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Exide-Ironclad

BATTERY

YEAR AFTER YEAR, one Exide-Ironclad improvement has followed another. It is a record of continuing progress . . . a steady flow of storage battery developments that have made Exide-Ironclad YOUR BEST POWER BUY AT ANY PRICE.

NOW COMES ANOTHER Exide-Ironclad advance . . . . . a polyethylene insulating tube sealer. This and other improvements combine to give you more dependable battery performance and longer-than-ever battery life.

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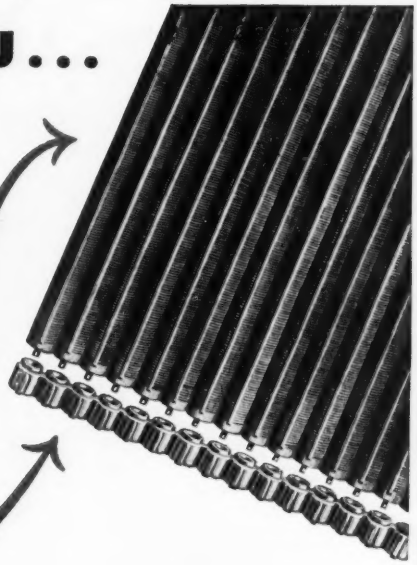
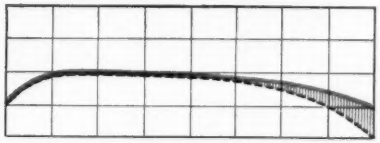


IMPROVED POSITIVE PLATE CONSTRUCTION
the long-life grids now contain SILVIUM —an alloy of silver, lead and other components—which make them highly corrosion resistant. Top conducting bar is heavier.

...with the New Polyethylene insulating tube sealer
An insulating sealer for the bottom of the tubes. Acid-proof, non-corroding plastic it fits snugly into slotted tubes of positive plate, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus, more active material remains available, and the high battery capacity is sustained for longer working life. (See chart at right.)



PERMANIZED NEGATIVE PLATES
Improved processing, a result of Exide Quality Control assures uniform plates with higher electrical efficiency. These negatives, teamed with the improved positive plates, give you a well-balanced combination for hard service and long life.

NEW SEALING COMPOUND
Through the cooperative efforts of Exide Laboratories and the Franklin Institute, a new homogeneous compound was developed. It makes a permanent seal between the jar and cover, resisting shock without cracking in high or low temperatures.

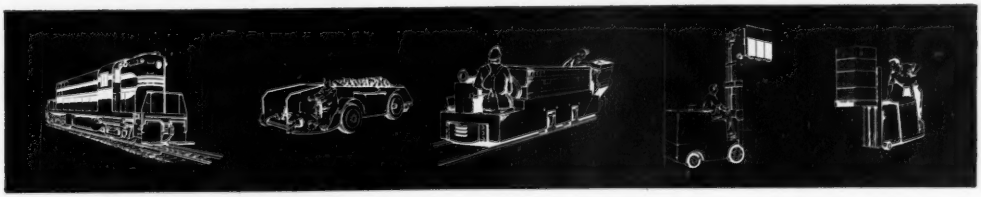
SEAMLESS SHOCK-PROOF JAR
Made of high quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long life and heavy-duty service.

CORROSION-RESISTANT TRAY GUARD
A plastic acid-resistant steel tray coating with high insulating quality and ability to withstand hard knocks.

NEW UNBREAKABLE PLASTIC VENT PLUGS
Made of unbreakable polyethylene. Can be quickly and easily removed to add water.

Types and sizes for storage battery applications for every heavy-duty service.

Write today for further information.



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a new synthetic flavor developed by Firmenich

One of the most appetizing of flavors—hickory smoke—may now be imparted to a wide variety of food products—meats, fish, cheese, sauces—quickly, efficiently, economically. Based upon original research, Hickory Smoke Flavor by Firmenich is stable to high temperatures and has long-lasting shelf life. Affecting minimum shrinkage, convenient application of this flavor is accomplished by its ready dispersion in brines and liquid products or by dry mixing with salt or other meat-curing preparations.

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Speeds heating and cooling of strained foods

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Dog Food	Cooking, Sterilizing and Cooling
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Edible Starch (For Salad Dressing)	Cooking and Cooling
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Strained Food	Sterilizing and Cooling
Soup	Sterilizing and Cooling
Lard	Chilling and Plasticizing
Margarine	Continuous Manufacture
Shortening	Chilling and Plasticizing
Sweetened Condensed Milk	Cooling and Crystallizing of Sugars
Invert Syrup	Cooling and Crystallizing of Sugars
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JUST PRIOR to canning at Gerber Products Company, strained baby foods are cooked and cooled . . . in a hurry. This operation is performed continuously . . . in a matter of seconds with VOTATOR® Heat-transfer Apparatus. This fast processing aids volume production at low cost.

Quality control also is facilitated. The food products are cooked and cooled in a closed system, thus oxidation or other contamination is impossible. Freshness and flavor are safeguarded at all times.

Improves many Process Operations. Throughout the food processing field, VOTATOR Heat-transfer Apparatus is used for heating and cooling, sterilizing, plasticizing, emulsifying, crystallizing, quick-freezing and aerating. If you process any liquid or viscous materials, it will pay you to investigate. Call on Girdler for complete process engineering, design, and construction service as well as for efficient processing equipment. Write The Girdler Corporation, Votator Division, Louisville 1, Kentucky. West Coast Office: 2612 Russ Building, San Francisco 4, California.

*VOTATOR—T.M. Reg. U.S. Pat. Off.

the GIRDLER Corporation
VOTATOR DIVISION

WHISKIES THE U. S. DRANK IN 1951; BRAND BY BRAND*

Rank	Brand	Cases Sold (est.) 1951
1	Seagrams 7 Crown	9,600,000
2	Calvert Reserve	3,600,000
3	Schenley Reserve	3,300,000
4	Corby's Reserve	2,700,000
5	Imperial	2,650,000
6	PM DeLuxe	1,600,000
7	Four Roses	1,500,000
8	Carstairs White Seal	1,400,000
9	Paul Jones	1,350,000
10	Old Sunny Brook	1,270,000
11	Cream of Kentucky	1,250,000
12	Old Stagg	1,200,000
13	Seagrams V.O.	1,150,000
14	Early Times	1,000,000
15	Fleischmann's Pfd.	950,000
16	Canadian Club	910,000
17	Park & Tilford Reserve	800,000
18	Hunter	770,000
19	Old Thompson	700,000
20	Good Old Guckenheimer	684,000
21	Echo Springs	680,000
22	Old Charter	620,000
23	Old Sunny Brook	610,000
24	Hill & Hill (BLEND)	600,000
25	Hill & Hill (STRAIGHT)	575,000

* Reprinted through courtesy of BUSINESS WEEK

Right: BEE-LINE Model 135 with twin labeling stations turns out up to 120 neatly labeled bottles per minute. BEE-LINE gives you a choice of 4 Models to fit your production needs and meet your range of glass container and label shapes and sizes. Ask us for recommendations, layouts and estimates.

"Repeat Orders are surest evidence of Satisfaction"

YOU'RE IN GOOD COMPANY WHEN YOU USE

WORLD BEE-LINE LABELERS

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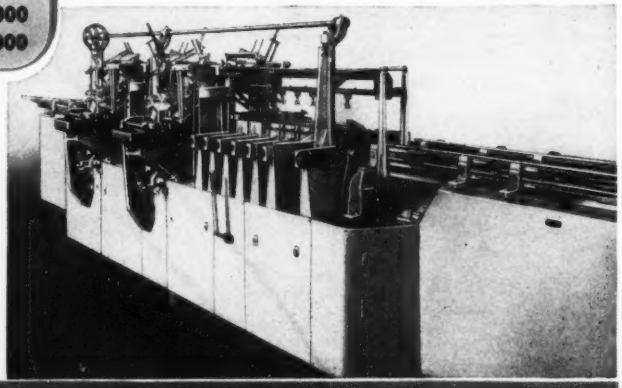
of these leading Brands are labeled on WORLD BEE-LINE LABELERS! Bottles labeled on the BEE-LINE have clean, neat, precisely positioned front and back body labels, neck labels, shoulder labels and/or medallions . . . 24 excellent reasons why you too should consider the BEE-LINE for better packaging, smoother production, and lower operating costs.



WORLD LABELERS

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ECONOMIC MACHINERY COMPANY
WORCESTER 3, MASSACHUSETTS
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MILWAUKEE, WISCONSIN

"Our *Powermaster* Boilers are dependable, efficient, easy to service, and economical to operate"

William H. Wagner
Plant Engineer
Blue Bird Silk Mfg. Co.

Alfred J. Sidler
Plant Manager
Blue Bird Silk Mfg. Co.

20% Saving in Steam Cost at York, Pa. Manufacturing Plant

William H. Wagner, Plant Engineer of the Blue Bird Silk Manufacturing Company, knows the problems of generating high-pressure steam 24 hours a day, 365 days a year. And he knows how serious it can be for a busy manufacturing plant if there is trouble or failure in the boiler room. That's why, two years ago, the company replaced their old-fashioned coal-fired boilers with two 200 h.p. POWERMASTER packaged automatic boilers, burning #6 (Bunker C) oil. Here is what they found:

- The cost of producing steam for processing and heating dropped 20%.
- The steam produced now is much dryer.
- The POWERMASTERS respond very rapidly to variations in load.
- Maintenance has been negligible.

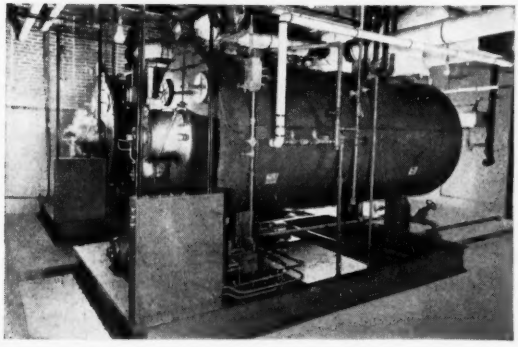
Little wonder that Alfred J. Sidler, Plant Manager, says, "If we had it to do over again, we would certainly buy POWERMASTERS."

No other packaged automatic boiler gives you *all 3 advantages of the Powermaster:*

1. SAVE FUEL—because the special *Powermaster* burner design gives you top efficiency when operating anywhere between 30% and 100% of capacity.
2. SAVE IN MAINTENANCE and clean-up time. Complete combustion of fuel gives practically smokeless and carbon-free operation. The burner has *no* moving parts to wear out . . . or to be cleaned daily.
3. CHANGE FROM OIL TO GAS (or gas to oil) in just a few minutes. Burn light oil, heavy oil, or gas—whichever is cheaper. You no longer need depend on one source of fuel supply.

Write for this Catalog

To get complete information about this modern packaged automatic boiler for steam or hot water, write for *Powermaster* Bulletin 1218. We'll be glad to put a copy in the mail for you.



These 200 h.p. POWERMASTER packaged automatic boilers have been operating round-the-clock for more than two years at the Blue Bird Silk Manufacturing Company, York, Pa. Burning #6 oil, they produce a total of 13,800 pounds of steam per hour.

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PACKAGED AUTOMATIC BOILERS

In sizes to 500 h.p.; pressures to 250 psi.

ORR & SEMBOWER, INC.

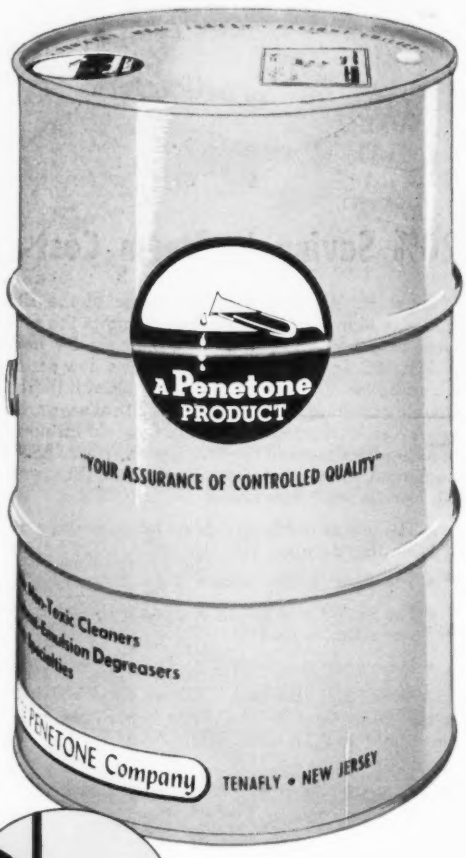
Established 1885

940 Morgantown Road, Reading, Pa.

"Our RHEEMCOTE 55-gallon drums are travelling billboards that constantly promote the Penetone name and products!"

—H. E. ROBERTS
DIRECTOR OF SALES,
THE PENETONE COMPANY

"In our opinion, the new Rheemcote process of lithographing large steel shipping containers is the most dramatic and worthwhile development in years of packaging progress. In transit, in storage, in use—even on its return trip to the plant—we know that our handsome Rheemcote Drum is selling our Penetone cleaning solvent and degreasing products. Certainly every progressive company depending upon large steel containers will recognize the many advantages of using Rheemcote Drums."



Give your products this extra boost!

For little or no more (possibly less!) than your present cost of drum identification and painting, your company, too, can profit from the use of extra-durable, poster-package Rheemcote Drums. Send for the free colorful booklet which gives complete information about Rheemcote poster drums, contains actual facts and figures about the effectiveness of Rheemcote containers as a new and vital advertising medium. Rheem Manufacturing Company, 570 Lexington Avenue, New York 22, N. Y.

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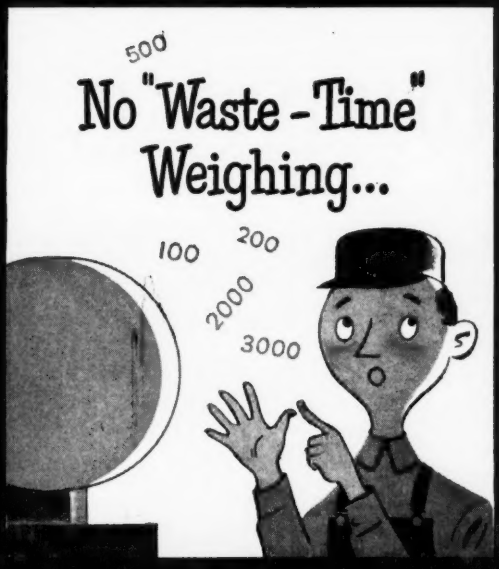

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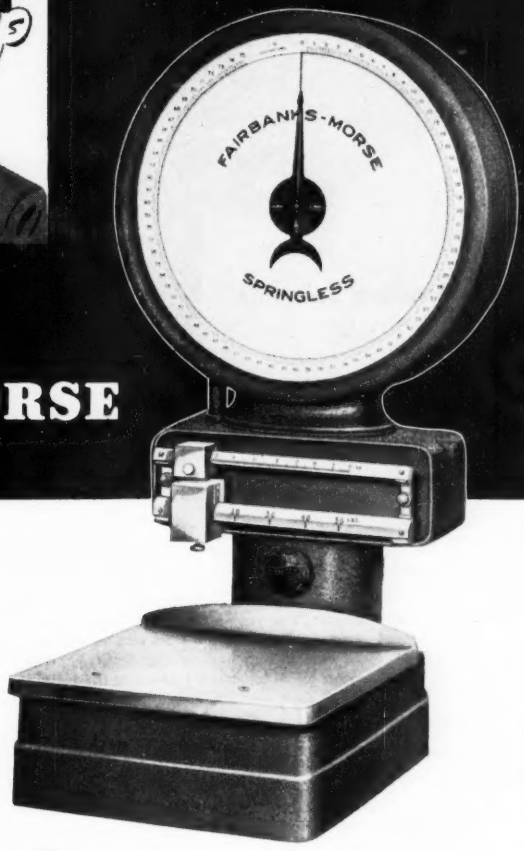
WITH

FAIRBANKS-MORSE



You speed your weighing operations with Fairbanks-Morse Bench Dial Scales. And that means there are no "bottlenecks" to hold up production all through your plant. Here's why:

With Fairbanks-Morse Bench Dial Scales, weights are read right at the point of the indicator. No time-wasting mental calculations are needed. You can weigh as fast as material can be moved on and off the scale platform. And, easy-to-read charts plus elimination of mental calculations reduce the possibility of human error . . . stop profit-eating weighing losses.

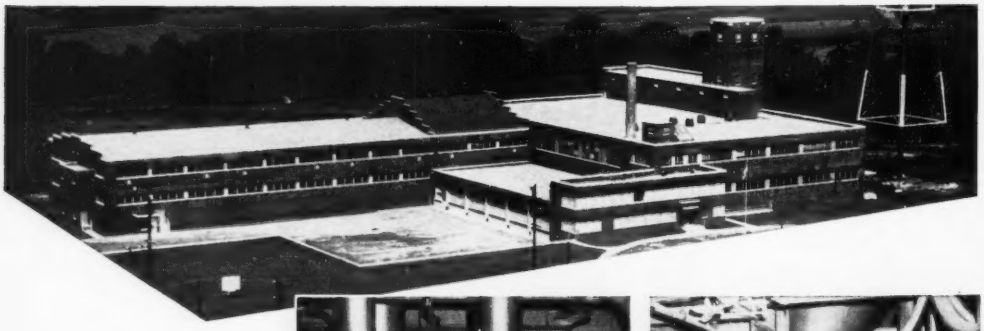
To eliminate "waste time" weighing in your operations, consult your Fairbanks-Morse weighing expert. Or, if you prefer, write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,

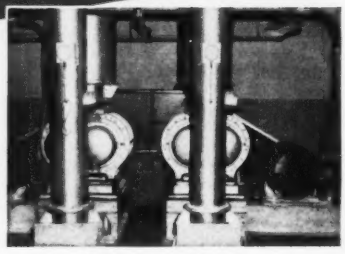
a name worth remembering

SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS
HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

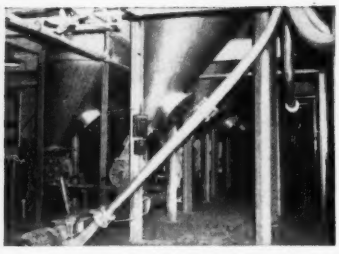
HOW LaRosa & SONS, INC. lowers costs



Handling Semolina with The AIRVEYOR



Exhausters which create air flow for conveying.



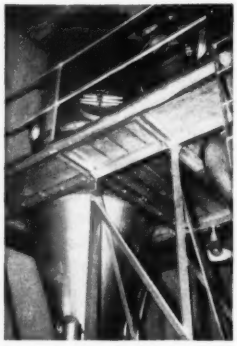
Fuller proportioning feeders underneath storage bins.

If your payroll lists more than one man for unloading or in-plant handling of semolina, your production is less than it could be, your costs greater than they should be.

V. LaRosa & Sons, Inc., on the basis of previous experience, recently installed two Airveyors, this time in their Hatboro, Pa. plant. One Airveyor is used primarily for unloading semolina from cars to storage, the other for withdrawing from storage and delivering to process. However, the two systems are so inter-connected that either one is capable of performing the duties of the other. Result: safer, faster, more sanitary, less costly material handling.

Whether you receive semolina in bags or bulk, the Airveyor can handle it. Airveyors may be used in a number of dollar-saving ways: From cars to storage, from storage to process, or direct to process. Systems have been installed in several food plants to blend while withdrawing from storage, or to convey to several delivery points. Whichever manner or combination of methods is desired, the Airveyor will convey your dry process materials rapidly, without dust, and in a sanitary manner. No time out for cleaning, either—the system is self-scouring.

If you're still using manpower for material handling, you're spending money needlessly. Call in a Fuller engineer now. His recommendations can lead to a new concept of conveying savings.



Filter type receivers, for unloading to storage, and withdrawing for delivery to process.

FULLER COMPANY
Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

Fuller

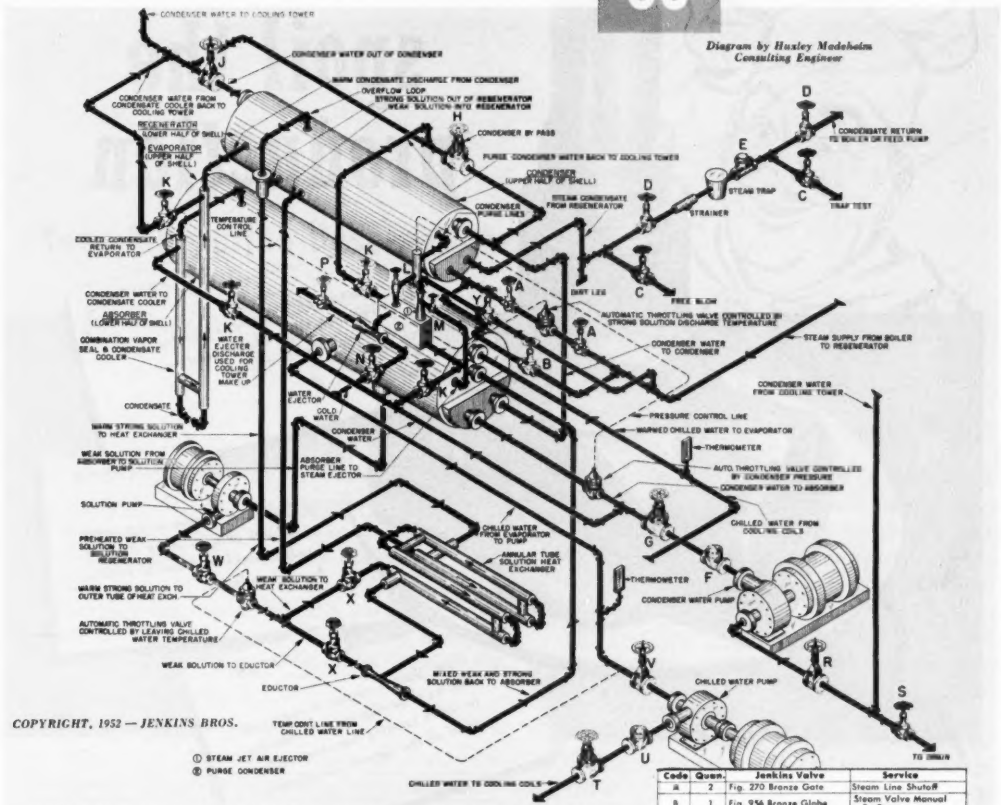
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

A-133

JENKINS PRACTICAL PIPING LAYOUTS

59

Diagram by Huxley Madeheim Consulting Engineer


CONDENSER WATER TO COOLING TOWER
CONDENSER WATER OUT OF CONDENSER
WARM CONDENSATE DISCHARGE FROM CONDENSER
OVERFLOW LOOP
STRONG SOLUTION OUT OF REGENERATOR
WEAK SOLUTION INTO REGENERATOR
CONDENSER WATER FROM CONDENSATE COOLER BACK TO COOLING TOWER
REGENERATOR (LOWER HALF OF SHELL)
EVAPORATOR (UPPER HALF OF SHELL)
CONDENSER BY PASS
PURGE CONDENSER WATER BACK TO COOLING TOWER
CONDENSER (UPPER HALF OF SHELL)
CONDENSER PURGE LINES
STEAM CONDENSATE FROM REGENERATOR
CONDENSATE RETURN TO BOILER OR FEED PUMP
STEAM TRAP
STRAINER
TRAP TEST
BAT LEE
FREE BLOW
TEMPERATURE CONTROL LINE
COOLED CONDENSATE RETURN TO EVAPORATOR
CONDENSER WATER TO CONDENSATE COOLER
ABSORBER (LOWER HALF OF SHELL)
COMBINATION VAPOR SEAL & CONDENSATE COOLER
WATER EJECTOR DISCHARGE USED FOR COOLING TOWER MAKE UP
AUTOMATIC THROTTLING VALVE CONTROLLED BY STRONG SOLUTION DISCHARGE TEMPERATURE
CONDENSER WATER TO CONDENSER
STEAM SUPPLY FROM BOILER TO REGENERATOR
CONDENSER WATER FROM COOLING TOWER
CONDENSATE
WATER EJECTOR
COLD WATER
CONDENSER WATER
PRESSURE CONTROL LINE
WARMED CHILLED WATER TO EVAPORATOR
THERMOMETER
WARM STRONG SOLUTION TO HEAT EXCHANGER
WEAK SOLUTION FROM ABSORBER TO SOLUTION PUMP
ABSORBER PURGE LINE TO STEAM EJECTOR
AUTO THROTTLING VALVE CONTROLLED BY CONDENSER PRESSURE
CONDENSER WATER TO ABSORBER
SOLUTION PUMP
CHILLED WATER FROM COOLING COILS
CHILLED WATER FROM EVAPORATOR TO PUMP
ANNULAR TUBE SOLUTION HEAT EXCHANGER
PREHEATED WEAK SOLUTION TO SOLUTION REGENERATOR
THERMOMETER
CONDENSER WATER PUMP
WEAK SOLUTION TO HEAT EXCHANGER
WARM STRONG SOLUTION TO OUTER TUBE OF HEAT EXCH
AUTOMATIC THROTTLING VALVE CONTROLLED BY LEAVING CHILLED WATER TEMPERATURE
WEAK SOLUTION TO EDUCTOR
EDUCTOR
MIXED WEAK AND STRONG SOLUTION BACK TO ABSORBER
CHILLED WATER PUMP
TEMP CONT LINE FROM CHILLED WATER LINE
TO DRAIN
① STEAM JET AIR EJECTOR
② PURGE CONDENSER
CHILLED WATER TO COOLING COILS

COPYRIGHT, 1952 — JENKINS BROS.

VALVE RECOMMENDATIONS For details of valves to suit varying conditions, see Jenkins Catalog.

Code	Quan.	Jenkins Valve	Service
A	2	Fig. 270 Bronze Gate	Steam Line Shutoff
B	1	Fig. 956 Bronze Globe	Steam Valve Manual By-Pass
C	2	Fig. 106-A Bronze Globe	Trap Test, Free Blow
D	2	Fig. 270 Bronze Gate	Steam Condensate Shut-off
E	1	Fig. 762 Br. Swing Check	Prevent Condensate Backflow
F	1	Fig. 624 I.B.B.M. Sw. Check	Condenser Pump Discharge
G	1	Fig. 142 I.B.B.M. Globe	Condenser Pump Discharge
H	1	Fig. 142 I.B.B.M. Globe	Condenser By Pass
J	1	Fig. 651, I.B.B.M. Gate	Condenser Discharge Shutoff
K	4	Fig. 106-A Bronze Globe	Condenser Water
L	1	Fig. 744-G, Bronze Needle	Condenser Purge Line
M	1	Fig. 743-G, Bronze Needle	Absorber Purge Line
N	1	Fig. 106-A Bronze Globe	City Water to Water Ejector
P	1	Fig. 47-U, Bronze Gate	Water Ejector Discharge
R	1	Fig. 651, I.B.B.M. Gate	Condenser Pump Suction
S	1	Fig. 106-A Bronze Globe	Condenser Water Drain Valve
T	1	Fig. 142 I.B.B.M. Globe	Chilled Water Pump Discharge
U	1	Fig. 624, I.B.B.M. Sw. Check	Chilled Water Pump Discharge
V	1	Fig. 651, I.B.B.M. Gate	Chilled Water Pump Suction
W	1	Fig. 75-A All Iron Globe	Solution Flow Control
X	2	Fig. 75-A All Iron Globe	Solution Flow Control
Y	1	Fig. 956, Bronze Globe	Steam Ejector Shutoff

How to plan ABSORPTION REFRIGERATION CONNECTIONS FOR AIR CONDITIONING

Absorption refrigeration systems for air conditioning generally use water as the refrigerant and a water absorbent salt solution which dissolves the vapor from the chilled water in the evaporator, with a very low pressure and temperature resulting. The chilled water is then pumped through coils of the air handling units.

The diluted salt solution is withdrawn from the absorber. A portion is pumped to an eductor, the remainder to the solution regenerated through an annular tube heat exchanger. In the regenerator, the weak solution is heated by a steam coil to boil off the water vapor dissolved in the absorber. This strengthened solution then returns to the absorber through the heat exchanger and eductor.

The steam boiled off the weak solution is condensed and returned to the evaporator pan through the vapor seal loop. Tandem steam and water jets maintain low pressure in both shells. Cold water from the water jet is used for makeup in the cooling tower.

Consultation with piping engineers is recommended when planning any major piping installations.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering, select all the valves you need from Jenkins complete line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17; Jenkins Bros., Ltd., Montreal.

COMPLETE DESCRIPTION AND ENLARGED DIAGRAM OF THIS LAYOUT FREE ON REQUEST. Includes additional detailed information. Ask for Piping Layout No. 59.

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
MADE IN THE JENKINS SHOPS

too few cooks spoil the production

PHILADELPHIA
Instead of 30 minutes per batch, a Philadelphia food processor now requires only 15 minutes.
CALIFORNIA
In California, a preserving company was able to make 2 extra cooks a week because the kettles heated up faster.
BOSTON
From Boston comes a report of kettles requiring only 12 minutes to reach cooking temperature, instead of the former 25 minutes.

What did all these plants have in common? They had switched from old-style steam traps to Yarway Impulse Steam Traps.

Yarway Impulse Traps are designed for more production . . . *to get equipment hotter, sooner and keep it hot.* Additional features include small size, easy installation, low maintenance, low cost, stainless steel construction . . . and Yarway service available from nearby Yarway steam trap engineers.

You can buy Yarways from the nearest of over 200 Industrial Distributors. Over 800,000 Yarway Impulse Traps already have been installed. Write for Bulletin T-1740.

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

You can try a Yarway trap for free in your own plant for 60 days. Prove its advantages under your own conditions. Drop us a card.

YARWAY

the steam trap designed with more production in mind

Your Margarine Deserves the Best...

Pfizer Pure Vitamin A*

• What greater factor is there in building your margarine sales than taste-appeal?

Because you have not spared cost or effort in arriving at the tops in taste, we believe your margarine deserves only the best in fortification... Pfizer pure Crystalline Vitamin A Acetate in Vegetable Oil. This product is odorless and tasteless. It will not impart any off-flavor or odor to the finished margarine.

Check these other advantages:

Pfizer Pure Crystalline Vitamin A Acetate in Vegetable Oil is highly stable by itself and in margarine. This can mean real savings since excessive overages will not be required.

It is uniform. Every shipment is subjected to rigid quality control to make sure it meets the high standards maintained by Pfizer for over one hundred years. Supplied in bulk or batch-size cans, Pfizer Vitamin A for margarine is packed for your individual requirements.

Pfizer is a dependable source. Year-in and year-out, your requirements will be met from the Pfizer plant at Groton, Conn.—one of the largest, most modern Vitamin A plants in the world.

We think you'll agree that your margarine deserves the product that offers all these advantages ...Pfizer Crystalline Vitamin A Acetate in Vegetable Oil. For further information, write to:

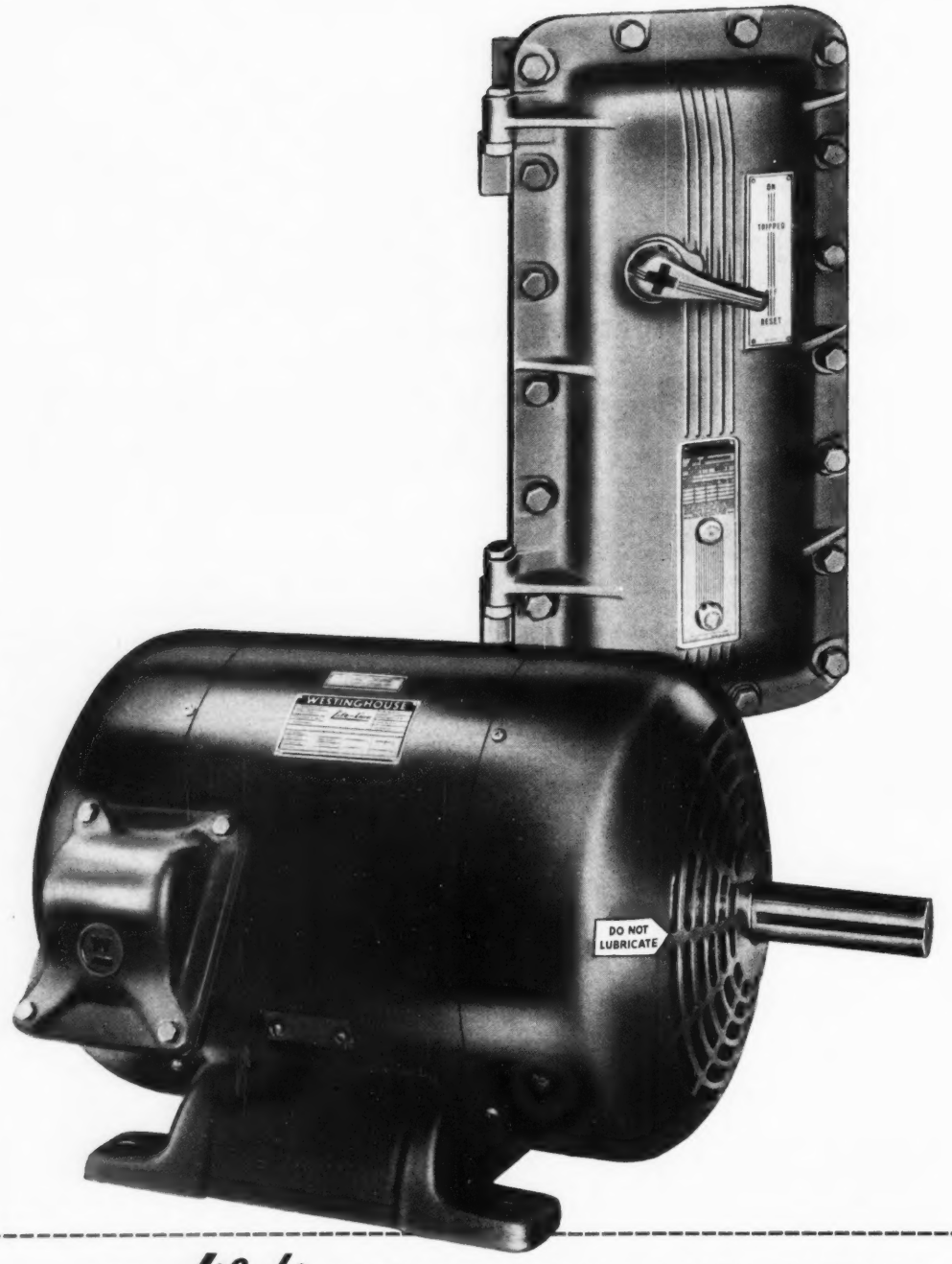
CHAS. PFIZER & CO., INC.
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.

*Refer to Applicable FDA Standard of Identity

Pioneers and Leading Manufacturers of Vitamins

PFIZER QUALITY ® PFIZER

For more information, use post card on last page.



WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

The time to stop explosions is before they start

And here's the equipment to do it

Dual Label Explosion-Proof Motor

In any location where Class II, Group G, or Class I, Group D explosive materials present a hazard, you can operate this Life-Line explosion-proof motor safely. It's underwriter approved for *both* explosive dusts and explosive vapors.

And the Life-Line offers extra protection against outages. Heavy steel construction provides greatest protection against physical damage. Pre-lubricated bearings need no further lubrication . . . eliminate outages due to faulty greasing. Superior winding techniques and insulation reduce electrical failures. Together they add up to longer life . . . less servicing.

For Hazardous Locations—Life-Linestarters®

Specially reinforced, cast enclosures with wide flame seals are available in Class I, Group D. Class II, Groups E, F, G are also available. Bi-metal overload relay protection and AB Circuit Breakers cut down time. In case of fault, no need to remove cover to reset breaker or overload relay mechanism. Service is restored immediately.

Simple design, single operation mean fewer operating parts to foul. Seesaw action of clapper prevents accidental operation. Kickout spring assures positive opening. Exclusive "De-ion®" arc quenching plus silver-to-silver contacts eliminates contact filing. Compare any other starter and see why Life-Lines offer more service with less servicing.

Together Life-Line motors and starters offer the food industry a new concept in performance. You get more service on the job . . . less down time and servicing. Ask your Westinghouse representative for complete details on both, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21701

YOU CAN BE SURE...IF IT'S
Westinghouse

Life-Line
MOTORS and CONTROLS

for Uniform Baking

of Premium Quality Breads...

GAS

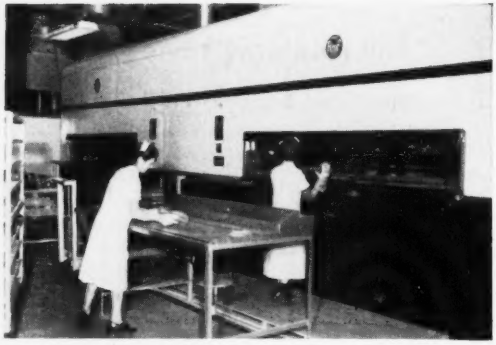
and Modern GAS Ovens

Pick up several loaves of Pepperidge Farms Bread and look at the uniform finish of both—the white and whole-wheat varieties. It's the sort of finish you expect in bread baked in Modern Gas Ovens with their precisely controlled temperatures and uniform heat distribution.

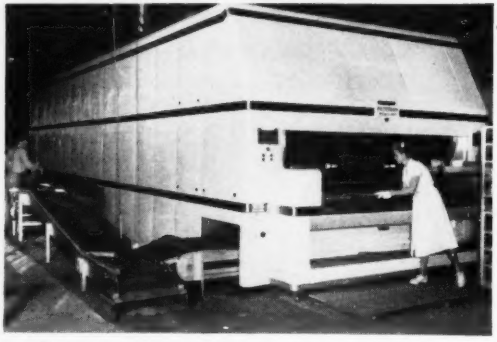
The selection of GAS and modern Gas Baking Ovens for the Downingtown, Pennsylvania, Bakery was not a chance decision by Pepperidge Farms, Inc. Earlier experience at the original Pepperidge Farm Bakery in Connecticut had convinced Mrs. Margaret Rudkin, Director, that GAS was the most dependable as well as the cleanest fuel for baking of premium quality breads.

Results obtained at this branch bakery confirm Mrs. Rudkin's choice of GAS for its convenience, economy, and dependability under all conditions.

Versatile GAS and Modern Gas Baking Equipment offer many advantages for every type of baking, from local service variety goods to the largest productioneering operations. Ask your Gas Company Representative for details.



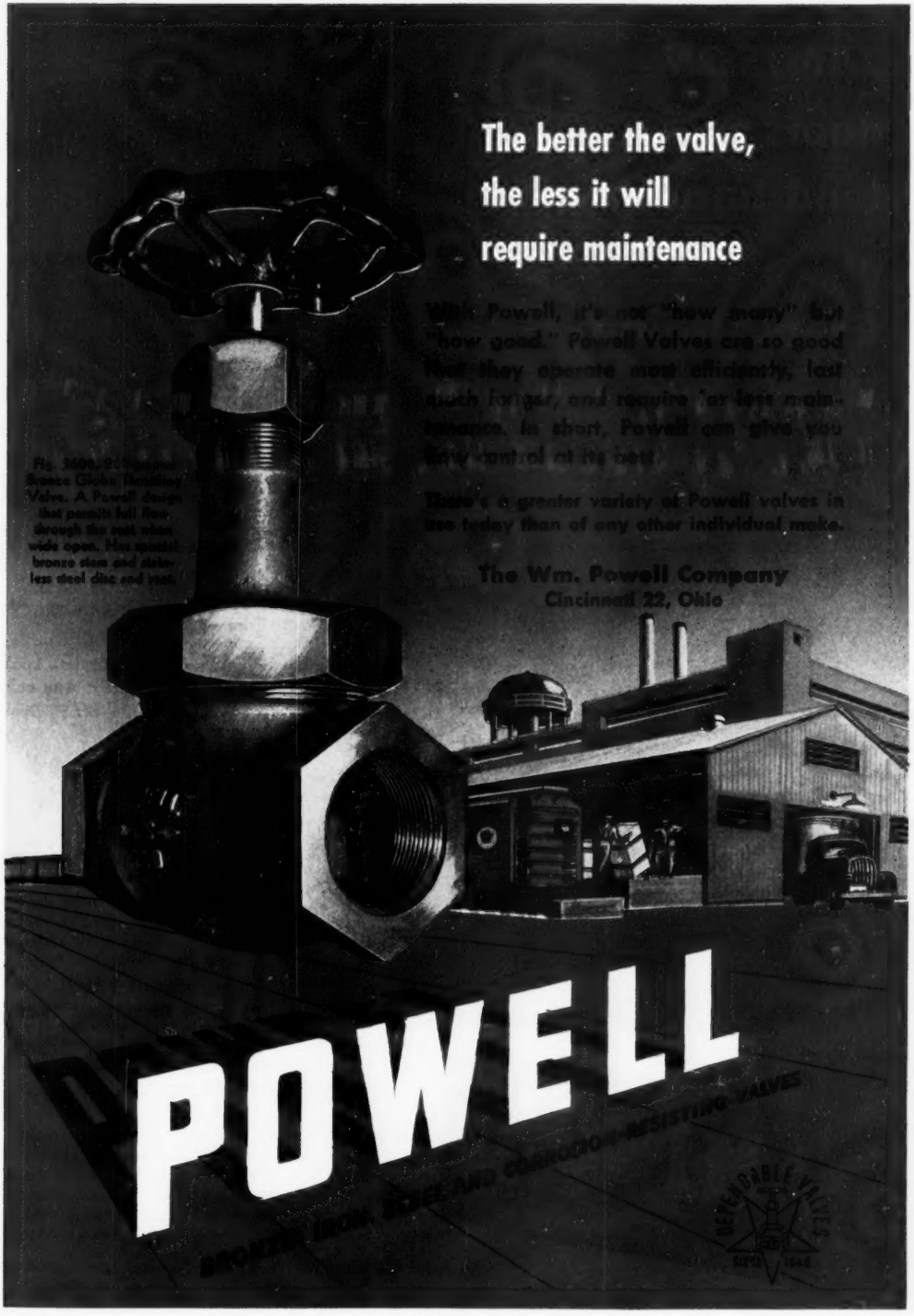
Two direct-fired GAS ovens of the reel type manufactured by American Machine and Foundry Co.



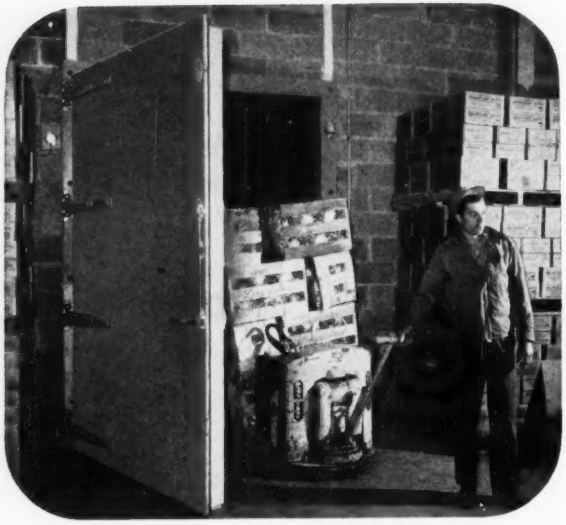
Peterson continuous tray oven utilizing direct-fired GAS burners.

MORE AND MORE
THE TREND IS TO GAS
FOR COMMERCIAL BAKING

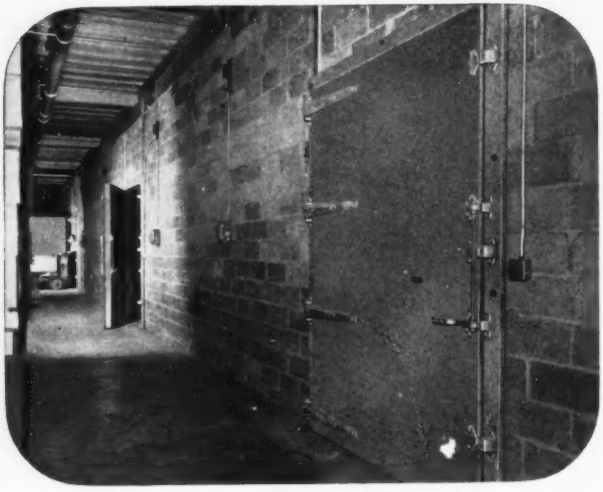
AMERICAN GAS ASSOCIATION • 420 Lexington Avenue, New York 17, New York


The better the valve,
the less it will
require maintenance
The Wm. Powell Company
Cincinnati 22, Ohio
POWELL

JAMISON doors speed food handling at Grand Union Warehouse



Installation at New Warehouse of Grand Union Company, Carlstadt, New Jersey.



WIDE OPENING FOR EASY HANDLING OF HAND TRUCKS

Exclusive Jamison Adjustoflex Hinges equipped with ball bearings, provide support with easy movement for the 6′x 9′ Door.

AMPLE HEIGHT FOR PASSAGE OF ELECTRIC TRUCKS

Monopanel construction of door gives greater rigidity and maintains seal.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

Request Catalog No. 3 for details and specifications.
Jamison Cold Storage Door Company, Hagerstown, Maryland, U. S. A.

Why we make a special bearing so costly that hardly anyone buys it

THIS is the most expensive bearing we make. It's the new Timken® "Double-Zero" bearing.

The "Double-Zero" is *twice* as accurate as the Timken "Zero" bearing—previously the most accurate Timken tapered roller bearing made. Achieving this super accuracy required new, specialized equipment, additional precision grinding operations and countless extra man-hours.

As a result, the cost of producing "Double-Zero" bearings is more than that for "Zero" bearings. Because of its high price, it is used by only a very few industries, in applications where extreme accuracy is vital.

But the *real* importance of the "Double-Zero" bearing goes far beyond its immediate use.

Experience gained in producing the "Double-Zero" bearing is showing the way to greater and greater precision in *all* Timken tapered roller bearings. And this increased precision will mean greater bearing capacities, permitting the use of smaller bearings at lower cost. Just as today's standard bearing was the super precision bearing of a few years ago, the new "Double-Zero" bearing of today may well become the standard Timken bearing of tomorrow. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

A PRECISION TIMKEN BEARING FOR EVERY REQUIREMENT

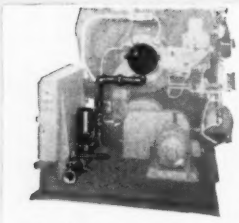
CLASS	RUN-OUT	TYPES AVAILABLE	SIZE RANGE
"00"	.000075"	All Types	Up to 10" O.D.
"0"	.000150"	All Types	Up to 12" O.D.
"3"	.000300"	All Types	Up to 12" O.D

TIMKEN®

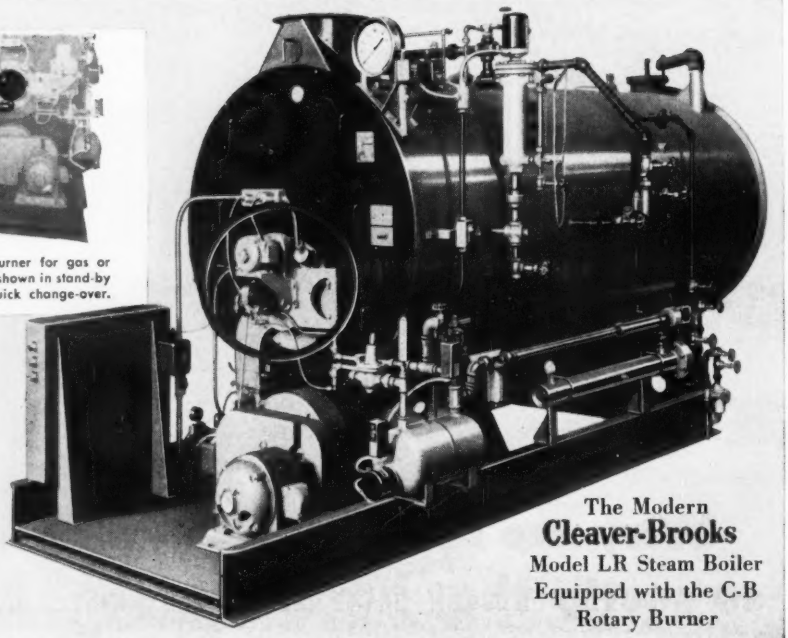
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⫿ AND THRUST —⫿— LOADS OR ANY COMBINATION

unmatched Flexibility of operation ...and of quick fuel change-over



Combination burner for gas or oil. Oil burner shown in stand-by position for quick change-over.



The Modern **Cleaver-Brooks** Model LR Steam Boiler Equipped with the C-B Rotary Burner

✓ **Quick Steaming—Fast, effortless response to fluctuating steam demands**

✓ **Equally high efficiency using heavy No. 6 oils (or lighter oils) and all types of industrial gas**

IF the quantity of steam required in your plant fluctuates throughout the day, depending upon the amount of steam-using equipment in operation, you can cut your steam costs substantially with a Cleaver-Brooks Boiler. It operates at a full 80% guaranteed efficiency whether you require maximum load use of all steam-using equipment . . . or whether your equipment is not in use, requiring as little as 30% response — often just enough to heat the plant.

Install a Cleaver-Brooks Boiler — oil, gas, or combination — either fuel properly proportioned by the exclusive Cleaver-Brooks Burner to meet your fluctuating or constant steam demand. Fully automatic, clean, with a single source for all of its matched parts . . . you benefit with lower fuel bills, less maintenance, reduced operating costs, greater profits. Why not consider changing your present boiler plant and think of flexibility — remember Cleaver-Brooks and get the complete facts on boilers, 15 to 500 HP — 15 to 250 lbs. psi.

Write for latest, fully illustrated and descriptive Cleaver-Brooks Steam Boiler catalog.

Cleaver-Brooks
STEAM BOILERS
the first and finest of their class

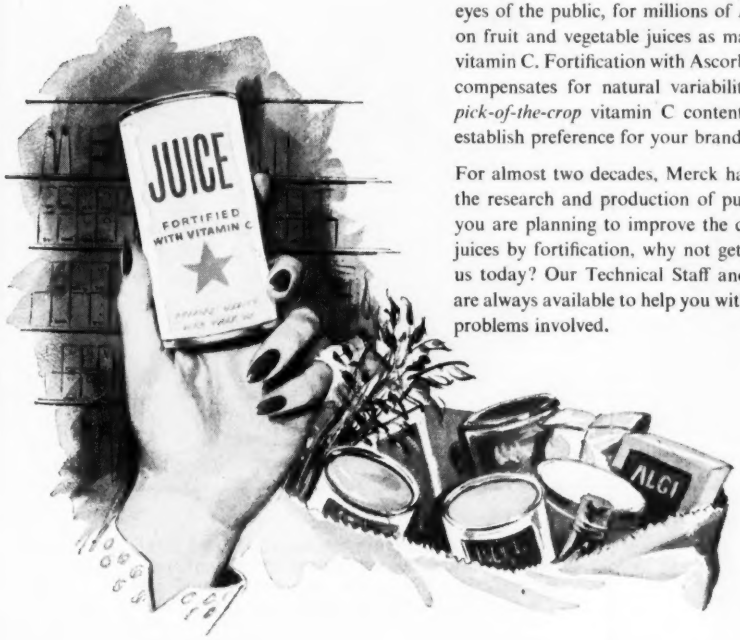
CLEAVER-BROOKS COMPANY
Dept. F-354 E. Keefe Ave., Milwaukee 12, Wis., U. S. A.
Cable Address: Clebro-Milwaukeewis

Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

For increased consumer appeal

Fortification gives your pack

"Pick-of-the-Crop" Vitamin C content



Fortification possesses definite sales appeal in the eyes of the public, for millions of Americans rely on fruit and vegetable juices as major sources of vitamin C. Fortification with Ascorbic Acid Merck compensates for natural variability and assures *pick-of-the-crop* vitamin C content, thus helping establish preference for your brand.

For almost two decades, Merck has pioneered in the research and production of pure vitamins. If you are planning to improve the quality of your juices by fortification, why not get in touch with us today? Our Technical Staff and Laboratories are always available to help you with any technical problems involved.

Ascorbic Acid (VITAMIN C) Merck U.S.P.

FOR FORTIFICATION AND PROCESSING

Research and Production for the Nation's Health

MERCK & CO., INC.
Manufacturing Chemists
RAHWAY, NEW JERSEY
In Canada: MERCK & CO. Limited – Montreal

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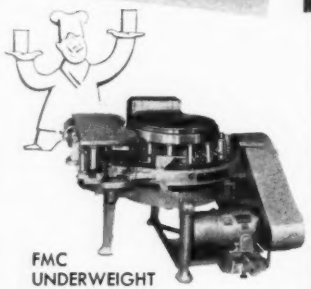
Modernize—Mechanize with work-saving

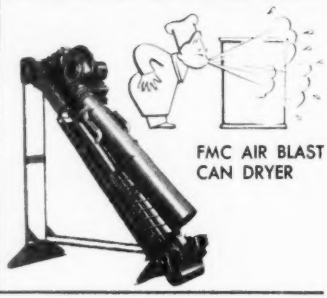
fmc CAN HANDLING EQUIPMENT

- speeds up canning line operations
- reduces handling costs to a minimum
- assures smooth, uniform handling
- eliminates can and product damage

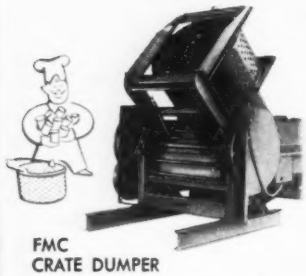
FMC UNIVERSAL CAN WASHER



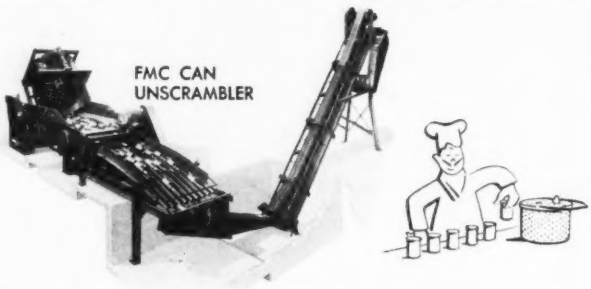
FMC UNDERWEIGHT CAN DETECTOR



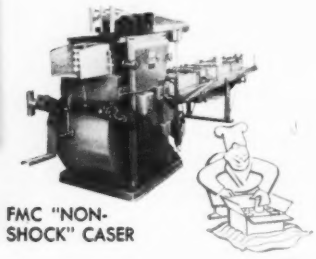
FMC AIR BLAST CAN DRYER



FMC CRATE DUMPER



FMC CAN UNSCRAMBLER



FMC "NON-SHOCK" CASER

These machines are representative of FMC's extensive line of special can handling equipment, at work for canners everywhere providing exceptional service in high speed flow-line operations. In point of overall performance, efficiency and economy, each unit reflects the highest engineering skill and experience, gained by FMC through more than 70 years of research and a close working association with canners in the best solution to their specific problems.

Write for full information or call your nearest FMC representative.

First in Diversified Food Equipment

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Division

General Sales Offices:

WESTERN: SAN JOSE 6, CALIFORNIA **EASTERN:** HOOPESTON, ILLINOIS

Send for free trial sample of this New Improved clear Lecithin!

New processing method makes STA-SOL Lecithin Concentrate 3 ways better!

1. IMPROVED CLARITY
is made possible by new refining operations. New, improved, clear STA-SOL Lecithin Concentrate may be readily used in a wide variety of products.

2. INCREASED UNIFORMITY
every single batch uniform in viscosity, color, taste and odor. When you use STA-SOL for your products . . . you can *always* be sure that each delivery will be of the same high quality.

3. GREATER CLEANLINESS
is assured by Staley's improved refining methods which remove more impurities, more of the unwanted by-products, giving you a purer, cleaner Lecithin Concentrate.

The new *STA-SOL* Lecithin Concentrate (vegetable) is as pure as modern technical skill can make it. The improved Staley process involves a shorter period of processing than ever before . . . creating a purer, finer grade concentrate that is competitively priced. For complete facts about improved *STA-SOL* Lecithin Concentrate . . . Mail the coupon now.

PIONEERS IN PRODUCTS FROM Staley CORN AND SOYBEANS

STA-SOL®

—Staley's premium quality Lecithin Concentrate at regular prices!

A. E. Staley Mfg. Co., Decatur, Illinois

A. E. Staley Mfg. Co.
Dept. FE-5, Decatur, Illinois

Please send me a sample of Staley's New Improved *Clear* Lecithin.

*Name*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

MAIL TODAY

Shallow Whitecaps . . .

PERFECT PROTECTION . . . the sure, safe kind which only a Vapor-Vacuum side seal can give to tumbler-packed foods. No other tumbler seal can equal its unfailing performance!

. . . . far and away the most widely used of all tumbler caps

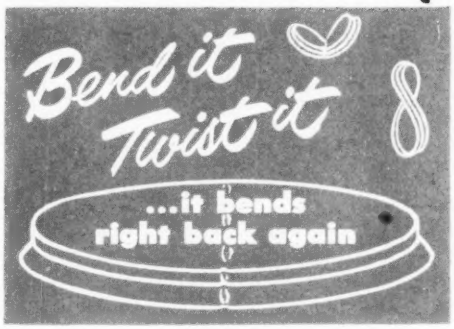
No matter how battered

This is the cap which isn't bothered by hook opener damage. When distorted, it is easily pushed back into shape—and is again ready to serve as a snug odor-proof, dust-proof cap.

. . .the nation's NO. 1 tumbler cap!

This is the cap that defies destruction by *rolling with the punch.*

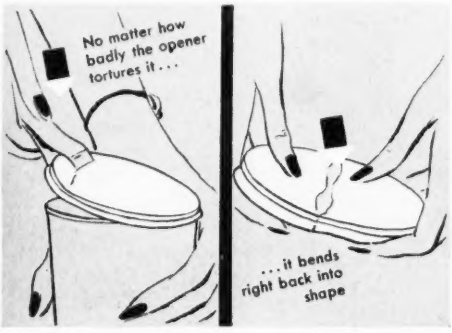
Like all tumbler caps, this one leads a hard life. Every time it comes into a kitchen, it has to encounter the deadly onslaught of the hook opener. But unlike other tumbler caps, *the Shallow Vapor-Vacuum Cap is ready to meet this onslaught—and survive.* When attacked and distorted, it doesn't just crumple up and quit. Instead, it just gives ground. Bending easily, it releases its grip on the package. Then, just as easily, it bends back for use as an effective re-seal.



King of the tumbler caps

In the famous family of Vapor-Vacuum Seals, the Shallow White Cap is the one which takes care of tumbler packed foods.

How well it takes care of this assignment is evidenced by the fact that its use now exceeds that of all other tumbler caps combined. Consider:



In construction, it is a regular Vapor-Vacuum side seal, with ample bearing on the side of the package. It may be used on any type of tumbler, full pressed, pressed and blown, and thin blown.

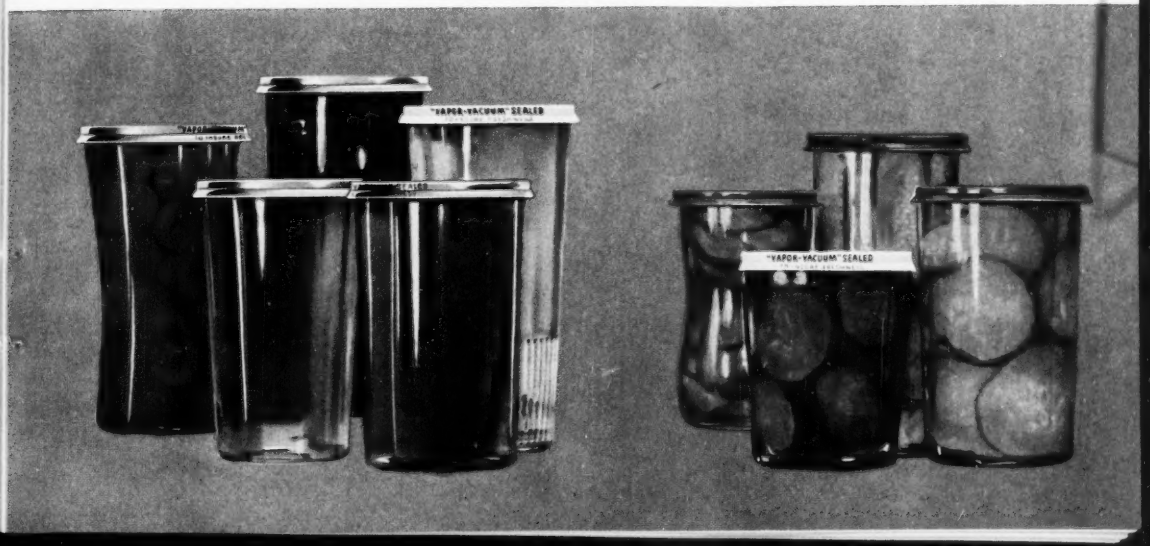
Its ability to defy distortion is based on a reduced vertical dimension and a special, easily flexed metal. Re-sealing action, because of its flexibility, is very good.

For narrow-neck ware—*Shallow Vapor-Vacuum Cap is also widely used as a pry-off cap on narrow-neck packages. In the 27 mm. and 38 mm. size, it provides easy opening, perfect re-sealing, and beautiful appearance.*

On tumblers or narrow-neck ware, consumers love it—and packers profit by its performance.

"VAPOR-VACUUM" Seal and Re-Seal PRODUCT OF WHITE CAP COMPANY

CHICAGO • NEW YORK • SAN FRANCISCO • ROCHESTER • PHILADELPHIA • LONDON, ENGLAND 5—52

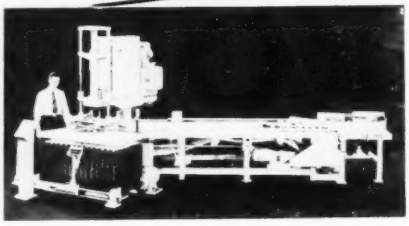


When looking for lower cost in Food Packing...

CHECK WITH BARNES

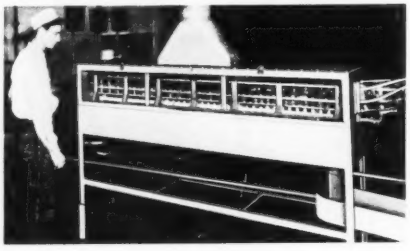
The products and installations we have made for the food industry are many and varied. However, each has one important feature in common . . . it has helped a food packer do a better job at less cost. These products and installations have resulted from our work in collaboration with food packers on specific problems. If you have similar or other problems in your plant it will pay you to talk to a Barnes' process engineer. There is no obligation for this service.

Over 500 Cans Unloaded per Minute

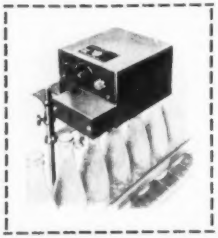


This unloader accommodates both rectangular and round cans. It is provided with a special rotary can unscrambler and a long conveyor to accommodate hand casing of cans containing whole hams. It unloads up to 600 cans per minute depending upon size and shape of cans.

Production Jar Washer



This is one of our newest items for the glass packer. Jars, prior to entering the washer, are inverted and enter the washer with open end down. A fine spray of hot water under high pressure is applied to both inside and outside of jars as they pass through the enclosed washer.



Electronic Detector

This efficient unit detects missing closures. It has full automatic operation, is single, fast and dependable. It has a wide range of application, prevents loss of product and minimizes line down time.

Other BARNES Processing Equipment

Automatic Retort Basket Loaders and Unloaders
Packaged Can Unloaders
Glass Handling Machines
Special Conveyors
Tray Loader
Pallet Unloader
Carton Uncaser
Double Seamer

FREE ADDITIONAL DATA on these and other time and money savers for the food packer will be sent upon request. Write today. Ask for bulletin E552.

W. F. and JOHN BARNES

PROCESS EQUIPMENT DIVISION 370 SOUTH WATER STREET, ROCKFORD, ILLINOIS

(Advertisement)

New Modern Cook Room With Aseptic Canning Provides 2 Important Features

Canners planning on expanding or opening new plants should carefully consider the Martin Aseptic Canning System for two very important reasons. For instance:

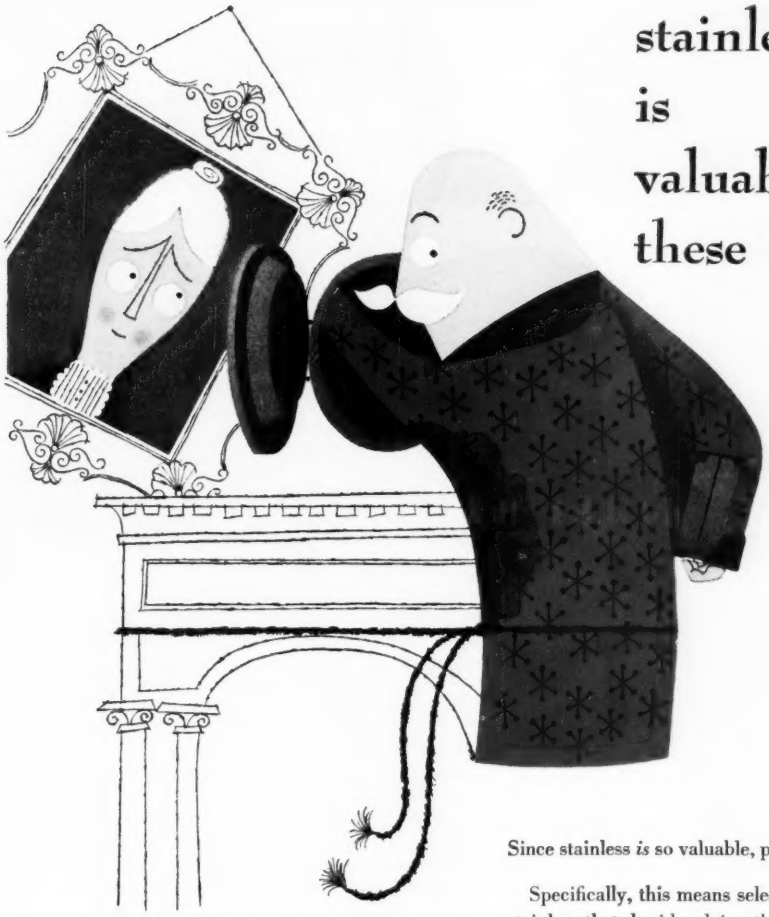
1. Savings in Labor Alone Justifies Purchase in Short Time

The labor savings effected with the Martin Aseptic Canning System are attractive. Two men are eliminated on retort and as many as 6 or more ordinarily utilized on "strapping-off" are also eliminated. In addition, processing time is amazingly short. For example: A No. 10 tin of pumpkin ordinarily requires 3½ hours cooking time and a No. 2 can of Cream-style corn, 80 minutes. With the Martin System, these foods are processed in approximately 20 and 30 seconds respectively. Full flexibility accommodates all standard-sized containers . . . and cold filling means *no after cooling.*

2. Cost of Original Installation Is Low

The original equipment cost of the Martin Aseptic Canning System is lower than conventional equipment. No retorts are needed and floor space is considerably less. In fact, the Martin Aseptic Canning System with all its modern advantages is the least expensive to install.

Discover how easily you can gain very high sterilization values—thus extending your margin of safety—without impairment or deterioration of product quality. Write to W. F. and John Barnes Company, 301 South Water Street, Rockford, Illinois.



stainless is valuable these days

Since stainless *is* so valuable, plan to make it go further.

Specifically, this means selecting a grade or finish of stainless that, besides doing the job adequately, will be in less demand than one you have been figuring on.

Here is where Crucible can help you out. The matchless experience of our metallurgists and stainless fabricating specialists can help you get the most out of your share of stainless.

Call upon us to help you.

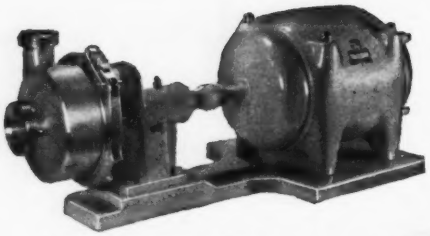
CRUCIBLE first name in special purpose steels

52 years of Fine steelmaking

STAINLESS STEEL

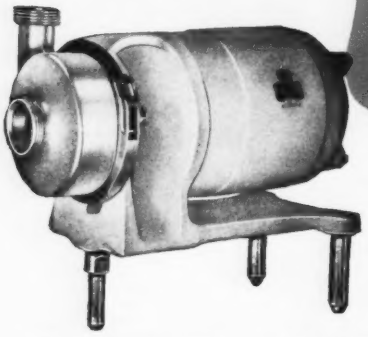
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REZISTAL STAINLESS • REX HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

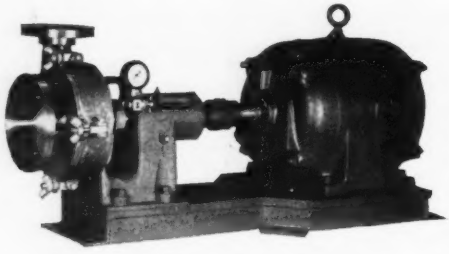


This model has been designed for the non-agitating, efficient pumping of milk, food products such as diced carrots, cream style corn, tomatoes, applesauce, relish and beverages. It is also practical in breweries and for the pumping of drugs and chemicals in solution.

In Modern PUMP DESIGN it's Tri-Clover



Designed for very efficient operation at 1800 and 3600 RPM, and especially where high speeds are required, through heaters, coolers, filters, clarifiers, etc. The 3600 RPM model is especially applicable in the dairy industry where high head and low capacity are essential and for handling low and medium viscosity liquids in the food processing industry.



Here is the model that is in demand to pump Latex, water, brine, light oils, chemicals, paints, brewery products, and liquids in the food processing field where lines are of heavy I.P.S. type. This model offers quick disassembly features for ease in cleaning.

OVER 30 years of continuous improvement is embodied in today's finer line of Tri-Clover centrifugal pumps.

The "Pump King" Sanitary Series—the Standard Sanitary Series—and the Industrial Series—all have exclusive Tri-Clover pump features that mean better, more efficient liquid transmission.

Patented screw type impeller with sanitary impeller clip—inert carbon seal that is easily removed and cleaned—streamlined, lightweight head with a minimum number of parts—simple, fast pump assembly and disassembly with the new Ring Clamp construction—these are just a few features that make Tri-Clover Centrifugal Pumps ideally suited for the food, chemical, dairy, and industrial requirements for sanitary and corrosion-resistant service.

Benefit from these important advantages when looking for a solution to your pumping problems.

Send for this Catalog

Here is one of the most complete, useful Pump Catalogs ever compiled . . . full of engineering data on all types of pump applications. Write for copy of CATALOG 250 today.

MEMBER NATIONAL DAIRY COUNCIL

EXPORT DIVISION

8 So. Michigan Ave., Chicago 3, U.S.A.

Tri-Clover® MACHINE CO.

Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

TRI-CLOVER

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

"How are these new aluminum kettles doing?"

"Great, Mr. Clemens*, we've increased our production considerably."

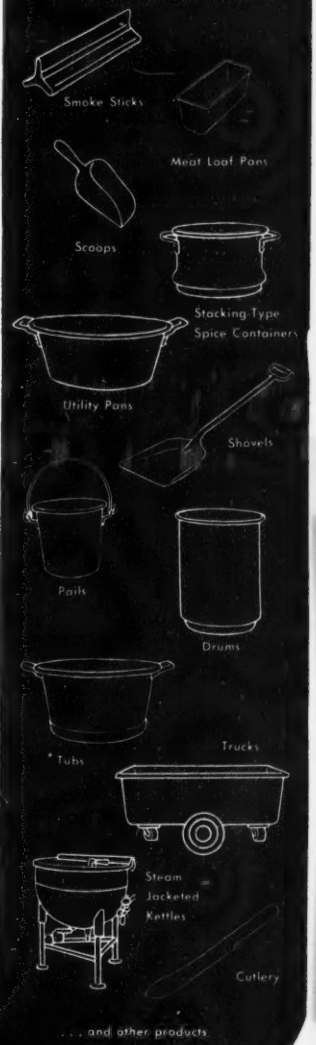
It's easy to understand why this and other food processors get enthusiastic about Wear-Ever Aluminum Steam Jacketed Kettles. For, when they convert to aluminum, the kettle department's production usually increases. This faster production is possible because aluminum spreads heat quickly and evenly *right to the top edge of the kettle.* Consequently, foods cook faster. And because the heat is spread so evenly, they cook better; scorching and burning are practically eliminated.

Moreover, every Wear-Ever Steam Jacketed Kettle—like all Wear-Ever food plant equipment—is made of an extra tough, extra hard aluminum alloy. Wear-Ever kettles have set amazing records for 20 to 30 years of continuous service—records which kettles made of the new hard alloy are sure to surpass some day.

For details on Wear-Ever's complete line of food plant equipment, see your Wear-Ever representative or mail the coupon below.

*Mr. Ezra S. Clemens
Hatfield Packing Co., Hatfield, Pa.

WEAR·EVER ALUMINUM EQUIPMENT FOR FOOD PLANTS



WEAR·EVER Aluminum

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

Standard of Quality for more than 50 years

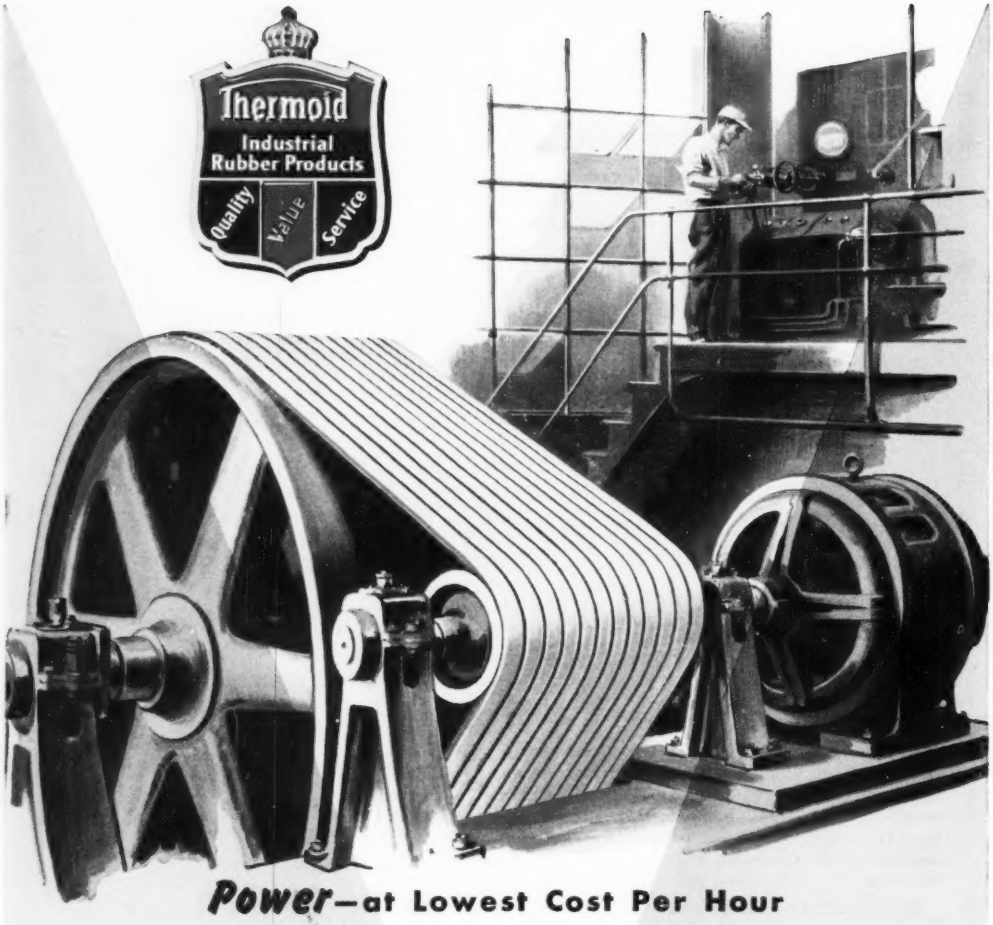
The Aluminum Cooking Utensil Company
305 Wear-Ever Building, New Kensington, Pa.

Please send me full details about your line of sanitary, hard-alloy aluminum kettles and other food plant equipment.

NAME .....

ADDRESS .....

Fill in, clip to your letterhead, and mail



Power—at Lowest Cost Per Hour with Thermoid Multi-V Belts

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and ability to absorb repeated shock loads . . . thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets—uniform in size and cross section. Their longer life and non-slip performance add up to "Power—at the lowest cost per hour."

Your Thermoid Distributor can help you with your power belting problems—whether you need Multi-V, F.H.P. or flat transmission belts. For unusual belt problems, a Thermoid Field Representative is always available to give you the benefit of his experience.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Square pegs wonderfully packaged in round holes

If your product is normally made for civilian use . . . using the same packaging for your DO's may be putting a very square peg in a round hole. *Defense packaging needs attention!* And that's where Visqueen* film comes in! Visqueen can improve your DO packaging without extra cost; possibly even at far less cost.

Visqueen has a flexibility needed for odd shapes and sizes. It gives longer "shelf life," greater protection. Visqueen is pure, tasteless, odorless and chemically inert. Pliable at extremely low temperatures—crackproof and waterproof. *Visqueen has an unusually high uniformity of gauge.*

It's possible that Visqueen film may be available shortly for your civilian packaging, too! In that case, Visking's wide experience with film can certainly benefit you. Visqueen will be pleased to offer advice on methods of handling, packaging line layout and types of film . . . for both military and civilian packaging. Go ahead—*Call on Visqueen!*

IMPORTANT! Visqueen film is all polyethylene, *but* not all polyethylene is Visqueen. Visqueen is the only film produced by process of U.S. Patent No. 2461975. Only Visqueen has the benefit of research and extensive technical experience of The Visking Corporation, pioneers in the development of polyethylene film.

Visqueen Packaging Firsts!

- liquid and dry chemicals and pharmaceuticals in drums, cartons and cases.
- weather balloons for armed forces
- bags for batteries for armed forces
- packaging of small machine parts (for moisture protection)
- rubber separators (as in camelback)
- liners for multi-walled bags
- bags for pre-peeled potatoes
- sterling silver flatware and hollow ware (as tarnish resistor)
- bags for poultry

VISQUEEN* film

. . . a product of THE **VISKING** CORPORATION • Preston Division, Terre Haute, Indiana

*T.M. The Visking Corporation

IN CANADA: Visking Limited, Lindsay Ontario.

For more information, use post card on last page.

YEARS OF CONTINUOUS LOW COST OPERATION WITH

STERLING SLO-SPEED!

That's the report of Mr. H. Reese, Plant Superintendent of Liebmann Breweries, Inc., of Brooklyn, N. Y., brewers of Rheingold Extra Dry Lager Beer. Mr. Reese further states... We have many Slo-Speed geared motors in use... they have given years of excellent service under 24-hour duty with low maintenance costs... minimum space is required for installation.

STERLING SLO-SPEED GIVES YOU THE ONE BEST LOW SPEED AND

gives uninterrupted service—carries heavy overhung loads—provides versatile mounting and flexibility in arrangement of machinery—saves valuable space—provides greater safety—costs less to install and use. An indispensable source of low speed power for:

Agitators	**Dryers**	**Presses**
Blenders	**Feeders**	**Pumps**
Blowers	**Kilns**	**Screens**
Conveyors	**Mills**	**Tumblers**
Cookers	**Mixers**	**Etc., etc.**

OTHER STERLING ELECTRIC POWER DRIVES:

- STERLING SPEED-TROL (VARIABLE SPEED) MOTORS
- STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS

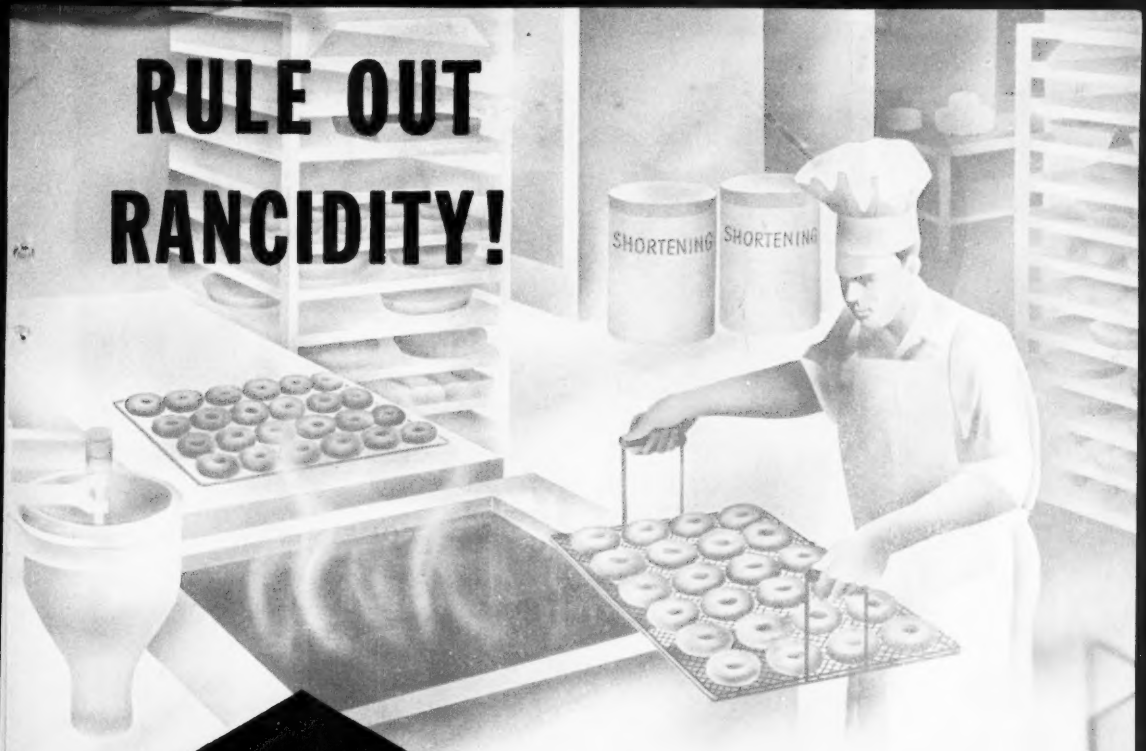
DRIP-PROOF • SPLASH-PROOF • TOTALLY ENCLOSED

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. *C-122*

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile.
Offices and distributors in all principal cities.

RULE OUT RANCIDITY!



Heyden PROPYL GALLATE

antioxidant & stabilizer

FINE HEYDEN CHEMICALS

Bakers and other users of shortenings know that freshness and sweetness must be safeguarded until the last bit is used. This is no less true of other materials that may turn rancid.

Protection against rancidity in oils and fats is easily secured with Heyden Propyl Gallate. Effective in low concentrations, this powerful antioxidant prolongs shelf-life and stabilizes color, odor and taste.

Propyl Gallate is a neutral, white powder approved by the Bureau of Animal Industry for use in animal fats. It also prevents auto-oxidation in waxes, ethers, emulsions and kindred products.

• • •

Heyden Propyl Gallate is shipped in 200, 100, 50 and 25 lb. fiber drums. Technical literature and samples will be forwarded promptly upon request.

Serving Industry Through Finer Chemicals

Benzaldehyde • Benzoates • Benzyl Chloride • Bromides
Chlorinated Aromatics • Creosotes • Formaldehyde • Formic Acid
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Paraformaldehyde • Parahydroxybenzoates
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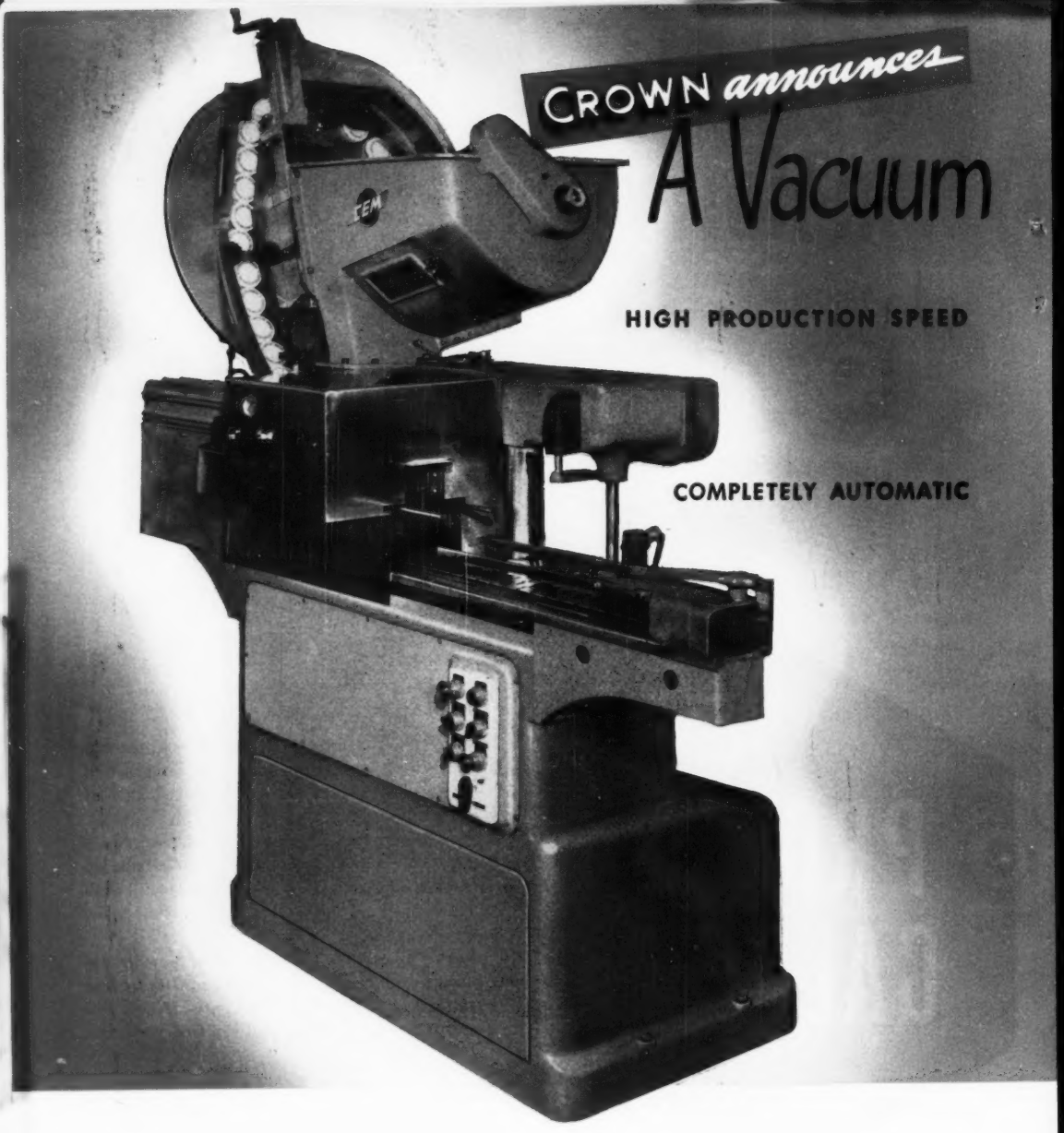


The New CEM
VACUUM LUG CAPPER

This machine provides a completely automatic system of high-speed vacuum sealing. It applies Crown Lug Caps which are lined with the well known Crown Slip Rubber Ring. These caps give perfect hermetic sealing and not only assure dependable protection for the product but also have the consumer convenience to give the product added sales appeal. The CEM Vacuum Lug Capper can be used with a wide variety of products and handles a wide range of jar sizes and cap sizes. Changing from one size jar or one size cap to another, or both, is simple and easy. It can be done in a matter of minutes.

May be used with or without vacuum

The CEM Vacuum Lug Capper may be used not only for vacuum sealing, but also for applying lug caps

Machine for applying LUG CAPS

The CEM Vacuum Lug Capper is an innovation in vacuum packing. Here, for the first time, is a high-speed vacuum machine for applying lug caps. Completely automatic in operation, it saves time . . . saves labor . . . eliminates many production difficulties. But most important of all, it uses a closure which has excellent consumer acceptance . . . a closure which not only seals dependably, but which is also easy to open and which re-seals perfectly.

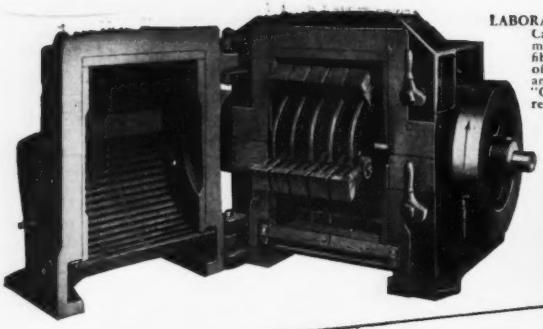
Those who have seen the CEM Vacuum Lug Capper acclaim it as a big step forward in the vacuum packing of foods . . . the biggest step in recent years. Naturally, you will want complete facts right away . . . and we are prepared to give them to you. Telephone, wire or write us.

CROWN CORK & SEAL COMPANY
Baltimore 3, Md.
Machine Sales Division

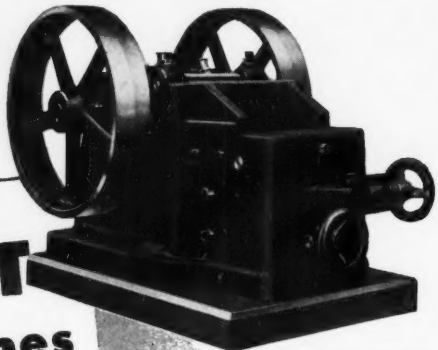
without vacuum. When vacuum sealing is not required, the hopper is simply filled with regular Crown Lug Caps and the machine operated without steam in the steam jacket.

If you don't need vacuum sealing

For those who have no need for vacuum packing, the CEM Lug Capper is available *without the steam jacket*. It gives the same fast, completely automatic operation and applies any standard lug cap.

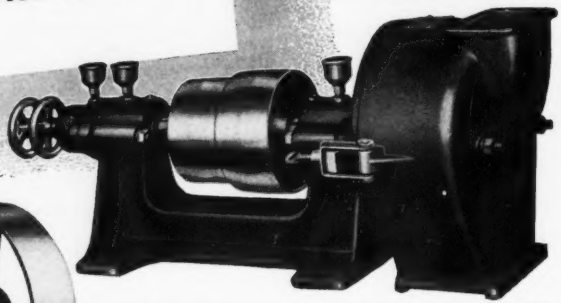


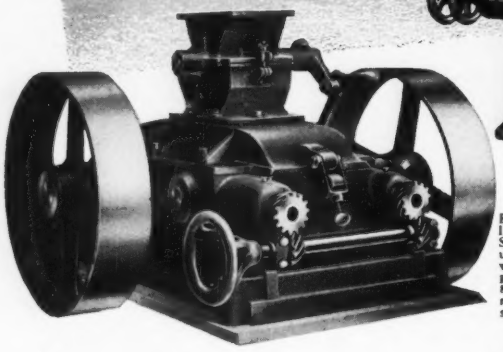
LABORATORY SWING-SLEDGE MILLS
Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT
Laboratory Machines
Assure Quality of Products
Fast - Economical - Accurate

LABORATORY JAW CRUSHERS
Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS
First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

LABORATORY SAMPLE GRINDER
Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY
106 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of:
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

Over 80 years ago, John Herman Pine first recognized, through self-treatment of a throat irritation, the demulcent . . . emollient . . . and hygroscopic properties of U.S.P. Glycerine. Today, Glycerine and Pine Bros. are virtually synonymous to a large segment of the general public . . . and consumer interest and acceptance is steadily increasing, as reflected in years of continuous sales increases.

FULLY ACCEPTED . . . FULLY AVAILABLE IN ALL GRADES!

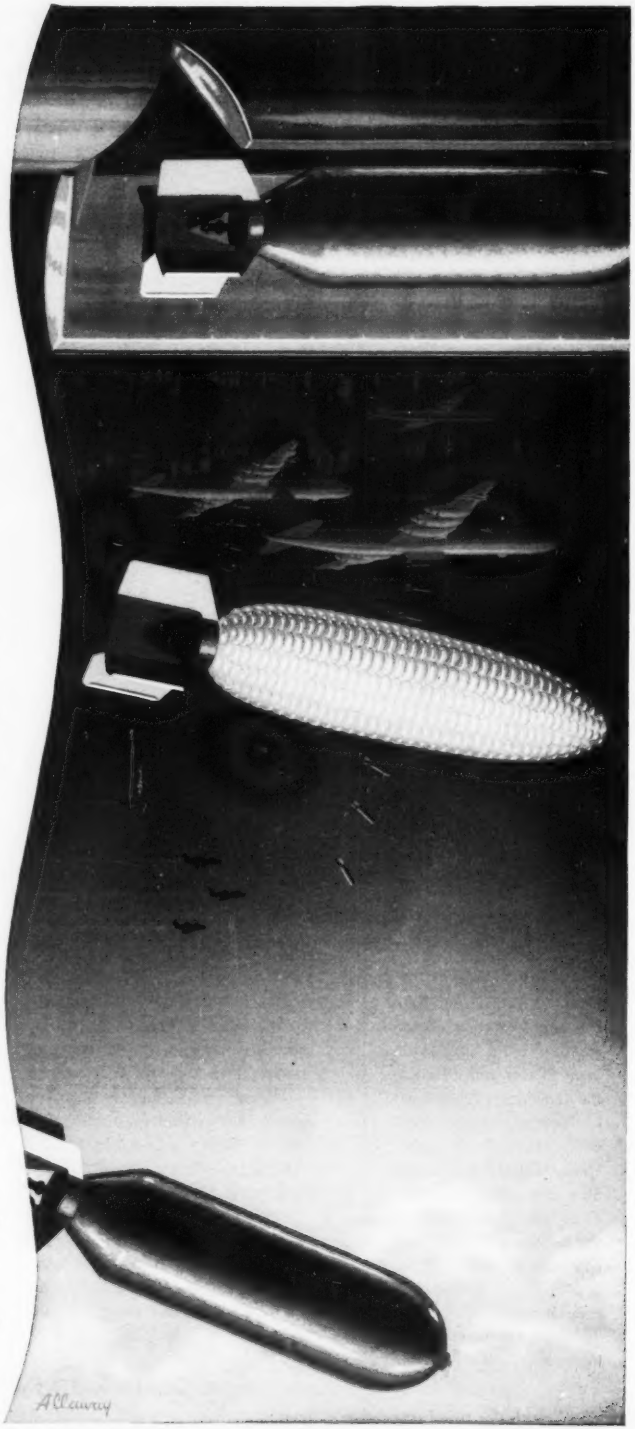
U.S.P. Glycerine serves the manufacturer of pastilles, confections and foodstuffs in a variety of ways! For instance, it acts as an ideal vehicle and blending agent for the five flavors that now make up the Pine Bros. family. Each tablet is uniform in appearance . . . uniform in taste! And versatile Glycerine—blended with Acacia, flavoring and other components—serves as a natural sweetener as well!

U.S.P. Glycerine, as a solvent and extractant for base flavors, is widely favored by extract manufacturers. It adds smoothness to mixtures . . . and distributes flavors uniformly. Even in the field of packaging materials, Glycerine has come to be an important component of wraps that come in contact with food products.

So it is today with dozens of familiar food brands . . . U.S.P. Glycerine often performs two or more functions—preserving freshness or making food products more palatable. In every instance, Glycerine is used with absolute confidence, since *it is actually a wholesome nutrient for food use!* "Why Glycerine for Foods?" tells the story of these many applications . . . why not write for a copy?

GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Avenue, New York 17, N. Y.

What's corn doing 35,000 feet up?



The casing of the bomb . . . possibly the high explosives inside . . . both require the use of special corn products in the manufacturing process. These, and hundreds of other corn products, have been developed by the continuing basic research in corn that serves all American industry . . . serves you.

Corn products in food

In the food field highest quality dextrose, regular and high-conversion corn syrups and superior starches are recommended ingredients for many processing formulas. New techniques involving the use of corn products are being developed as part of a continuing research program at Corn Products Refining Company.

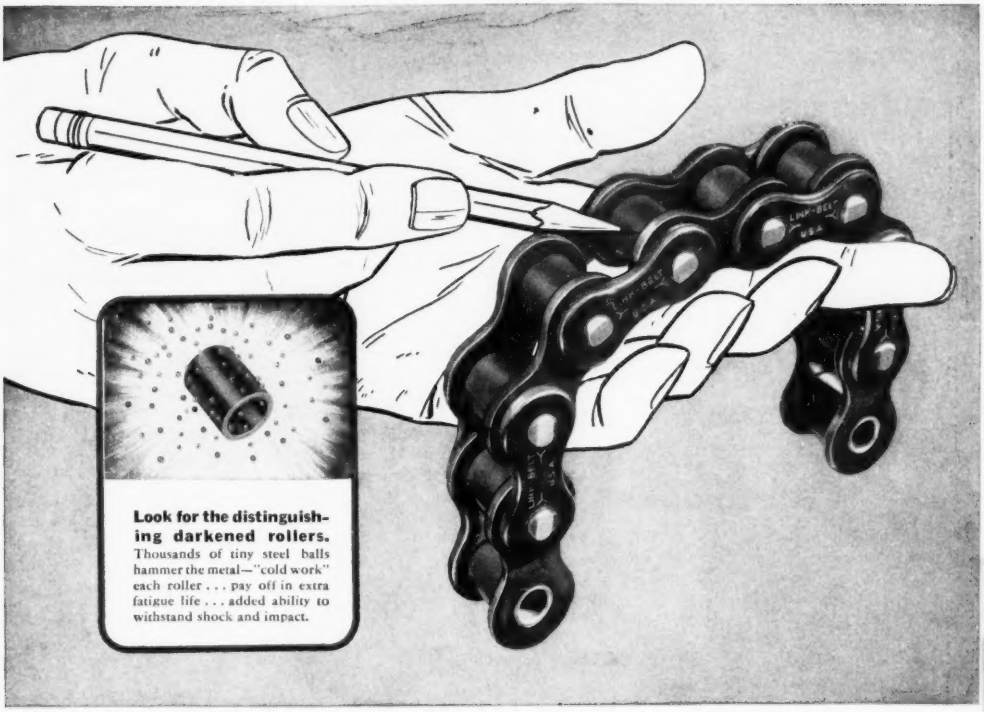
If you have a production problem why not check with Corn Products? A complete line of corn products for every purpose is available. Technical service is yours . . . no obligation, of course.

CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.

Manufacturers of

CERELOSE® brand dextrose • **PURITOSE®** brand corn syrup • **GLOBE®** brand corn syrup

BUFFALO® brand starch • **HUDSON RIVER®** brand starch


Look for the distinguishing darkened rollers.
Thousands of tiny steel balls hammer the metal—"cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact.

It's the SHOT-PEENED rollers that give your roller chain extra life!

. . . one of the extra-wear features you get with every LINK-BELT Roller Chain

POWER-TRANSMISSION engineers and metallurgists agree—shot-peened rollers mean longer roller chain life. That's just one of the engineering extras you get with Link-Belt Precision Steel Roller Chain. Another is Link-Belt's exclusive lock-type bushing.

Remember, too, Link-Belt's rigid material selection and controlled heat treating assure chain uniformity . . . no weak members.

Link-Belt builds a complete line of roller chain—single or multiple widths in 3/8" through 3" pitch; and double pitch, 1" through 3". Submit your chain problems to the Link-Belt office near you.

No partial bearing here —bushing fits securely

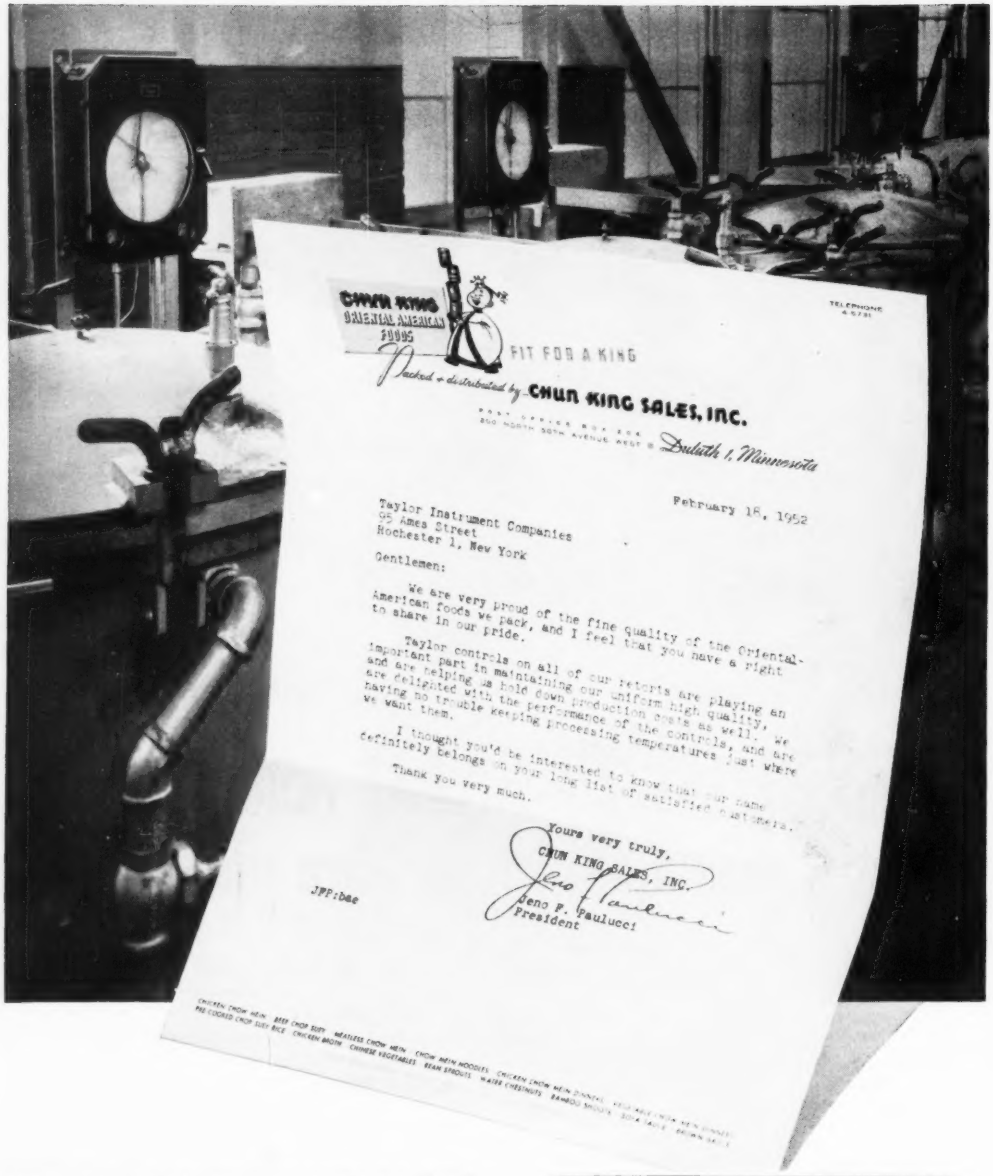
Lock-type bushings increase ability to withstand severe operating conditions

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1" pitch and double pitch roller chains through 2" pitch.

LINK-BELT

Precision Steel Roller Chain

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,697


CHUN KING
ORIENTAL AMERICAN
FOODS
FIT FOR A KING
Packed & distributed by CHUN KING SALES, INC.
Duluth 1, Minnesota
February 18, 1952
Taylor Instrument Companies
95 Ames Street
Rochester 1, New York
Gentlemen:
We are very proud of the fine quality of the Oriental-American foods we pack, and I feel that you have a right to share in our pride.
Taylor controls on all of our retorts are playing an important part in maintaining our uniform high quality, and are helping us hold down production costs as well. We are delighted with the performance of the controls, and are having no trouble keeping processing temperatures just where we want them.
I thought you'd be interested to know that our name definitely belongs on your long list of satisfied customers.
Thank you very much.
Yours very truly,
CHUN KING SALES, INC.
Jeno P. Paulucci
President
JPP:bae

We make instruments to help canners cut costs, protect product quality in just about every phase of the canning process. Ask your Taylor Field Engineer, or write for **Catalog 500.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

GET big truck advantages at small truck cost with

YALE WORKSAVERS

3,000 LB. HIGH-LIFT FORK WORKSAVER

SAVE **TIME AND SPACE.** Move giant loads up to 185 feet per minute—with safe, easy speed control. Utilize *all* storage and production areas.

SAVE **MUSCLE POWER.** Transport and lift capacity loads with a smooth flow of power that's easy on the operator, easy on the load.

SAVE **HANDLING COSTS.** Mechanize handling on low-load floors; in freight elevator operations; and in other areas where weight or space rule out big trucks.

PALLET WORKSAVER

TRACTOR WORKSAVER

PLATFORM WORKSAVER

HIGH-LIFT PLATFORM WORKSAVER

YALE WORKSAVER Electric Hydraulic Lift Trucks are built for loads up to 6,000 lbs., and are ideally designed to accommodate skids or pallets. Their wide acceptance throughout industry is based on the YALE reputation for top performance in electric trucks of *every* kind.

There's a Yale Worksaver to meet your every need

GET AN EYE-OPENING DEMONSTRATION RIGHT IN YOUR OWN PLANT OR WAREHOUSE

Your YALE Representative will demonstrate the cost-cutting advantages of the rugged WORKSAVER line to you. All you have to do is name the time and place. Naturally, there is no obligation.

Be sure to ask about the famous WORKSAVER "package"—*truck, battery, battery charger.* The YALE Selenium Charger saves time by charging WORKSAVERS right on the job.

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

YALE & TOWNE

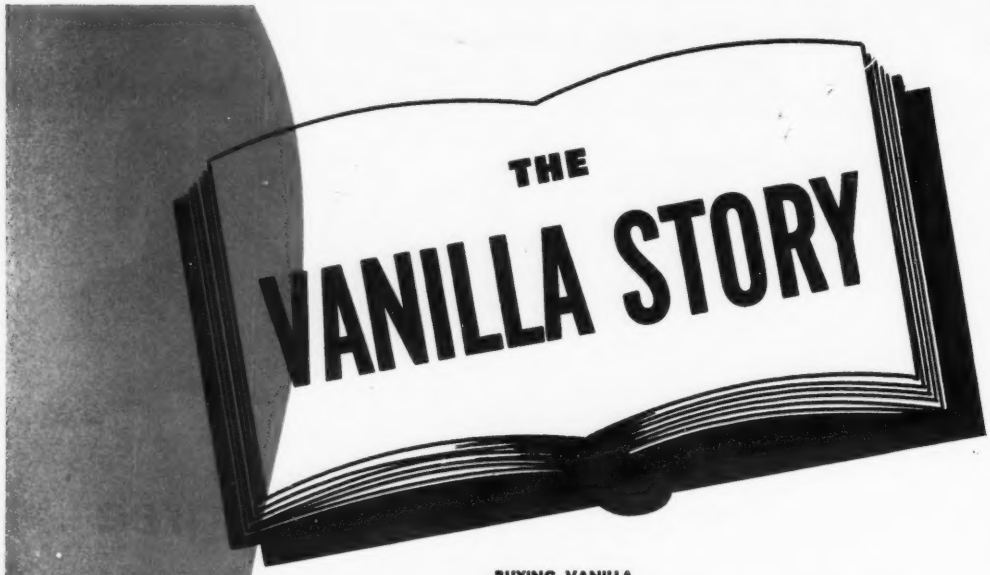
MAIL THIS COUPON TODAY

The Yale & Towne Manufacturing Co., Dept. 465
Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Pa.
Cutting costs with YALE WORKSAVERS interests me, too.

☐ Please have your local Representative call on me.
☐ Please send me a free copy of the new WORKSAVER Catalog.

Name..... Title.....
Company.....
Street..... City..... State.....
In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS



BUYING VANILLA
IS A CONFUSING JOB AND KNOWING WHAT YOU'RE GETTING IS EVEN MORE DIFFICULT.

Here's the Reason

The finest flavor is that of an old fashioned, leisurely extract of the best Mexican or Bourbon beans. Due to yield and time required, such extracts are seldom seen in today's market. To meet practical price requirements, economies are used, such as speedier and exhaustive extractions, cheaper grades and powdered beans . . . then for further savings, the imitations, using vanillin, other aromatics and even coumarin. Each has its flavor value yet each step carries flavor farther from true vanilla. In trying any vanilla, pure or imitation, compare it to the finest pure extract. Get the best you can afford.

ALVA can supply the finest as well as every other practical grade of vanilla for every use, honestly priced and honestly labeled. Here are a few:

- Pure Vanilla Extracts, single strength, 2, 4 and 10 fold
- Oleo Resin Pure Vanillas
- Imitation Vanillas
- **ALVANYA** (imit. vanilla absolute) duplicating the aromatic portion of the bean itself. Excellent when used alone or to improve any commercial vanilla at a saving. Extreme temperature stability.
- Vanilla sugars, pure and imitation.

Tell us what you want and we will send you the best vanilla to meet your requirements.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET, NEW YORK 19, N. Y.

Alva FLAVORS

RIGHT IN YOUR OWN BACK YARD ... BY WEST

TO HEAR DIEHARD TELL IT, NO INSECTICIDE COULD DO THE JOB IN HIS PLANT ··· UNTIL ··· YOU GUESSED IT ··· HE TRIED "DOUBLE PENETRATION!"
SNA-FOOD KOMPANY
HEY, BOSS, HAVEN'T FOUND A TRACE OF WILD LIFE SINCE LAST WEEKS FOGGING WITH VAPOSECTOR!
H'MM! I'M BUGS, IF VAPOSECTOR DOESN'T DO THE TRICK!
WHY TEAR UP THE FLOORBOARDS? I CAN'T EVEN HEAR A FADING HEART-BEAT!
HERE'S THE COST SHEET, BOSS-- 12,000 CUBIC FT. HERE ··· SO IT ONLY COST US A BUCK TO FOG THIS WHOLE DEPARTMENT WITH OUR WEST ATOMIZERS!
THEM'S NOT BUGS ··· THEY'RE POPPY SEEDS FROM SOMEBODY'S LUNCH-BOX
REMEMBER THE FIRST VAPOSECTOR DEMONSTRATION? IT POSITIVELY RAINED INSECTS!
I WAS ITCHING TO TELL YOU THAT!
NO SMELL, NO STAIN, NO AFTERTASTE ··· VAPOSECTOR QUALIFIES HERE, CHIEF!

DIEHARD'S CASE ISN'T SO UNUSUAL AFTER ALL! In all types of industry West representatives hear comments like "our situation is a special one" . . . "an insecticide is bound to impair the quality of our product" . . . and – stranger still – "we don't have any insect problem here!"

VAPOSECTOR was formulated for the realist who *has* an insect problem and wants to get rid of it – fast! It's fully three times as concentrated as the standard Grade AA spray . . . yet there's no danger of contamination or odor when used according to directions. Vaposector controls insects by "double penetration". When used with West spraying equipment, it becomes a "dry fog" that *penetrates* the most remote crevice . . . then *penetrates* the insect's outer covering for a permanent kill. There's no place to hide. No time to escape. A Vaposector demonstration has often revealed dead insects in numbers never thought possible – simply because they live and multiply in unseen cracks and crevices.

VAPOSECTOR gives more positive control value per gallon than any competitive product. It breaks down into such minute droplets when atomized with specially-designed West equipment, that only one ounce is needed to control flying insects in 1000 cubic feet . . . only two ounces for crawling insects. Compare it with an ordinary mill spray and you'll find Vaposector is over *four times as economical in use!* West can supply Vaposector as well as special mill sprays and fumigants . . . residual and contact insecticides . . . spraying equipment – a *complete insect control program* tailored to your exact needs!

WEST DISINFECTING Company

42-16 West Street
Long Island City 1, N. Y.

ASK FOR FURTHER INFORMATION ON HOW TO CONTROL INSECTS BY "DOUBLE-PENETRATION"

Dept. 8

☐ Please send Vaposector booklet.

Please send information on specially-designed permanent ☐, portable ☐, hand spraying ☐ equipment

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

324 WILSON, SO. NORWALK, CONN.

Meet four master salesmen

Have you a meat product you want to push in self-service meat departments? If so, Marathon can help you with a specialized package . . . perhaps one of the four master salesmen shown here . . .

Pick-Pak—made of Wonder White board that will not stain. Displays your bacon, your brand and your price to best advantage.

Look-Pak—sausage sales soar when packed in eye-appetite-appeal Look-Pak. Product and brand get clear visibility.

Wallet-Pak—for sausages and other processed meats. Protects and displays the product ideally. Stacks firmly! Easy to pack and price mark!

Wonder White Lard Cartons—made of Marathon's exclusive Wonder White board. Highly resistant to grease stains. Fresh, bright cartons sell lard faster.

Other Marathon packages include Kartridg-Pak for franks and margarine cartons. All made and designed to Marathon standards of top quality. See your Marathon representative or write Marathon Corporation, Menasha, Wisconsin.

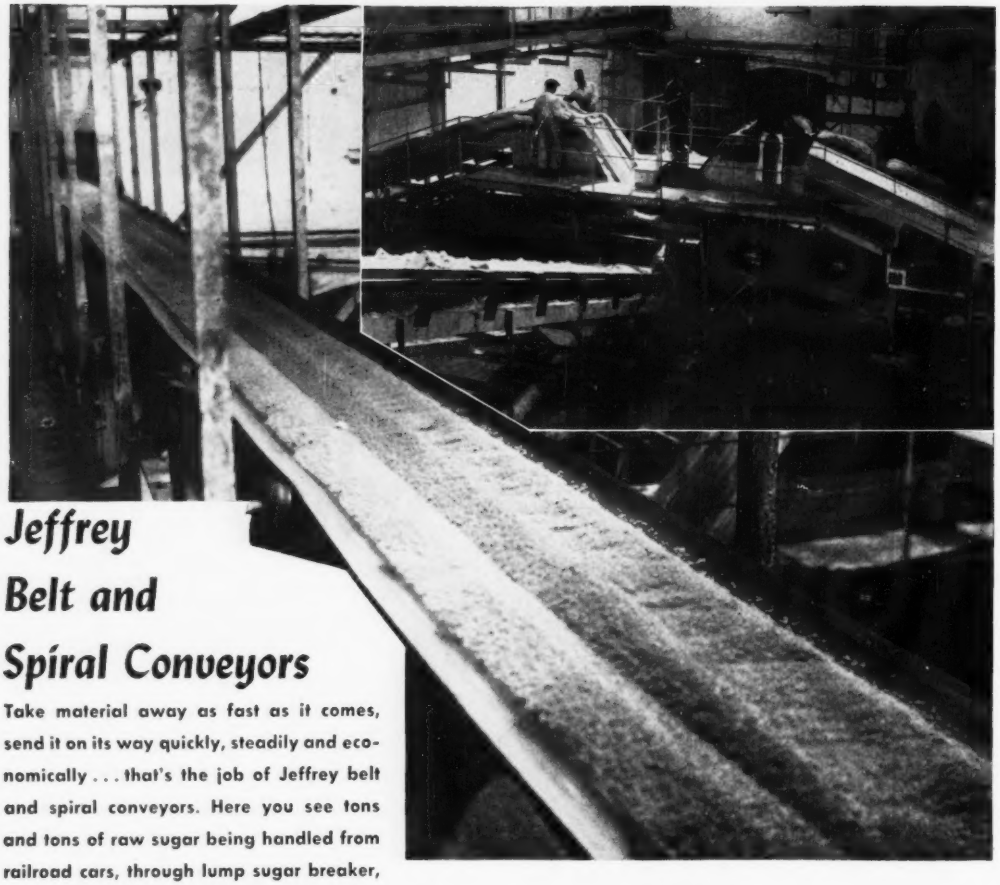
Visit our booth, 604-605, Supermarket Institute Convention, May 11-15, Cleveland Auditorium, Cleveland, Ohio

Marathon

packaging that sells food

For more information, use post card on last page.

for FAST HANDLING of LARGE TONNAGE



Jeffrey Belt and Spiral Conveyors

Take material away as fast as it comes, send it on its way quickly, steadily and economically . . . that's the job of Jeffrey belt and spiral conveyors. Here you see tons and tons of raw sugar being handled from railroad cars, through lump sugar breaker, and on to the refining process. Dependable operation and steady flow mean more profit to the operator. Whether individual units or complete systems . . . Jeffrey engineers will see you through. Send for literature.

Bin Valves
Bucket Elevators
Car Pullers
Crushers
Chains
Conveyors
Coolers
Feeders
Idlers (belt)
Packers
Pulverizers
Screens
Sprockets
Transmission Machinery

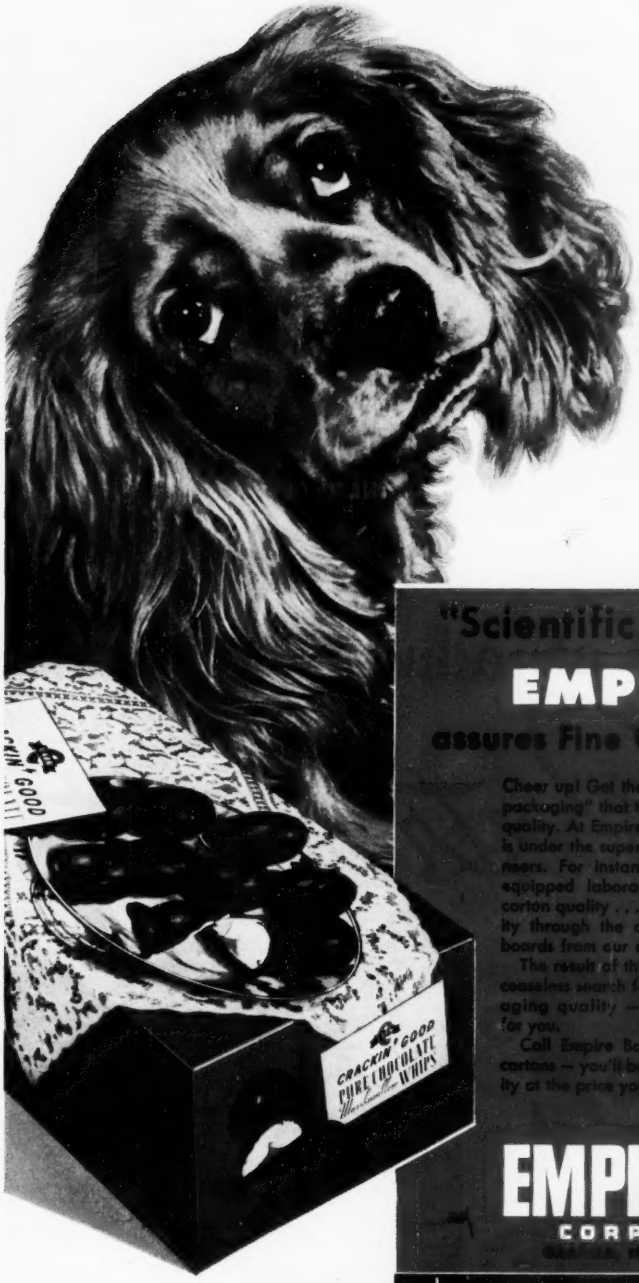
THE JEFFREY MANUFACTURING COMPANY

927 North Fourth St., Columbus 16, Ohio

1877 75 YEARS 1952

Baltimore 2 · Beckley, W. Va. · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 15 · Denver 2 · Detroit 13 · Forty Fort, Pa. · Harlan, Ky. · Houston 2 · Jacksonville 2 · Milwaukee 2 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 1 · Salt Lake City 1

Jeffrey Mfg. Co. Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio



This attractive package is representative of the fine folding cartons Empire Box is producing for leaders in industry.

thinking about the quality of your cartons?

"Scientific Packaging" at EMPIRE BOX assures Fine Quality...Low Cost!

Cheer up! Get the lowdown on Empire's "scientific packaging" that takes the guesswork out of carton quality. At Empire Box, every phase of production is under the supervision of expert packaging engineers. For instance, in the modern, completely equipped laboratory, trained technicians guard carton quality . . . constantly seek to improve quality through the development of superior paperboards from our own mill.

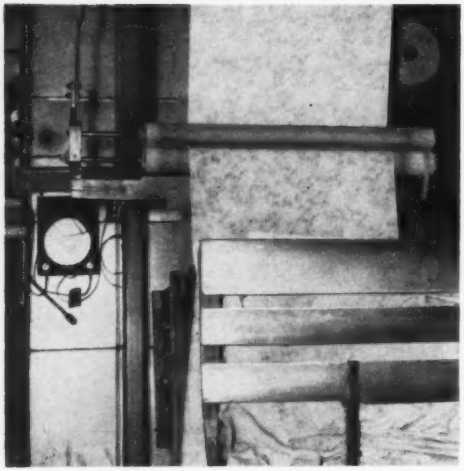
The result of this strict laboratory control — this ceaseless search for better cartons — is finer packaging quality — greater packaging economy for you.

Call Empire Box when next you need folding cartons — you'll be on the track of top carton quality at the price you want to pay.

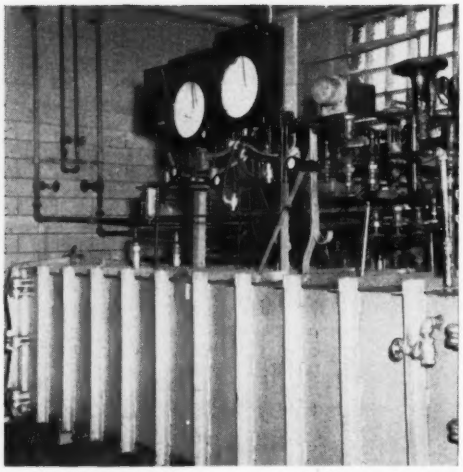
EMPIRE BOX CORPORATION

FINE FOLDING CARTONS SINCE 1903

For more information, use post card on last page.



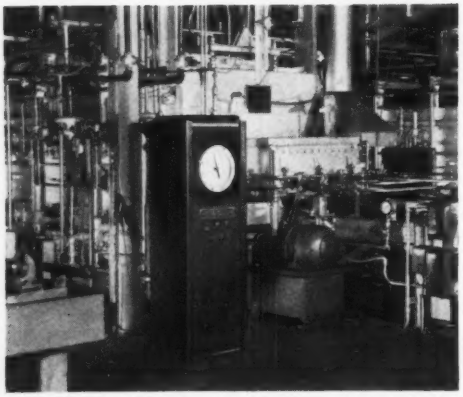
$30,000 SAVING IN ONE YEAR *was effected in this textile finishing mill . . . with the help of the Brown thermometer controlling the temperature of the print dryer. Controlled condition drying eliminated jagged fabric rips which had resulted in absolute waste.*



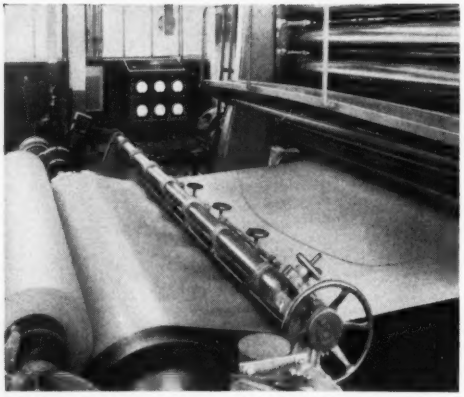
DUAL USE OF RETORT, *thanks to custom-built control system, permits using same equipment for boiling meats that is used for pressure-cooking glass-packed products. Cook time has been cut; glass breakage eliminated; labor saved; and production increased for both jobs.*

For all of industry... *especially*

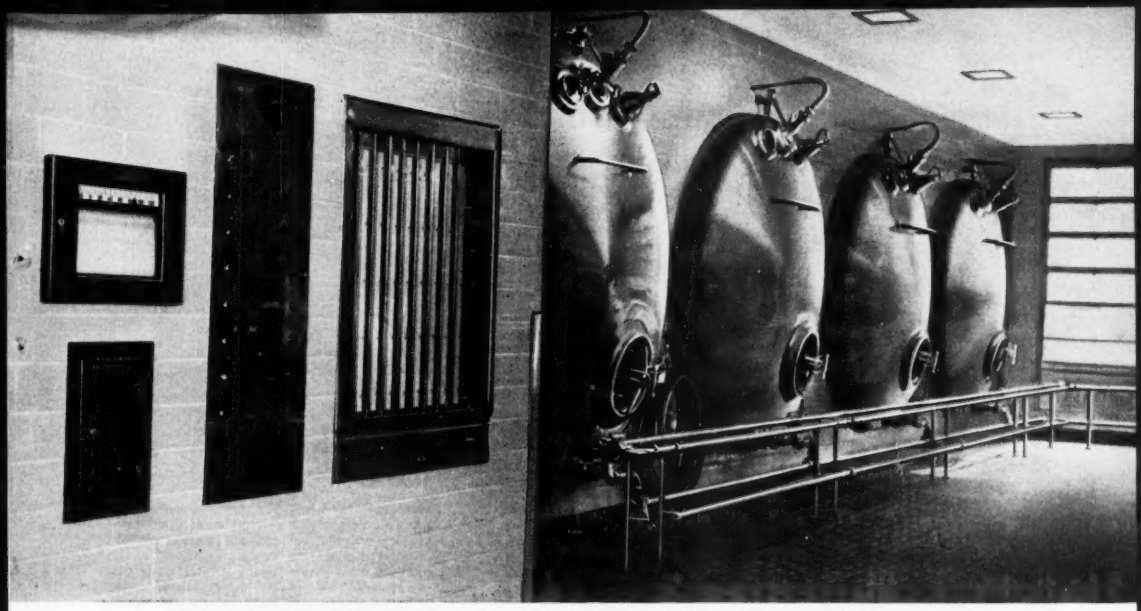
Instruments



PREVENTING COSTLY ERRORS *in heat treatment is the job of this Brown dew point recorder. Carburizing, nitriding, dry cyaniding and carbon restoration are affected by the dew point of gases employed, and have a profound effect upon the final metallurgical results.*



ALL BTU'S ACCOUNTED FOR . . . *in this machine room. Brown integrating flow recorders keep close track of every pound of steam . . . give speedy indication of excessive steam consumption. A variety of instruments hold operating costs at a minimum throughout pulp and paper mills.*



STORAGE TEMPERATURES CENTRALIZED *on this multi-point* ***ElectroniK*** *Recorder are easy for the operator to check at any time in a big eastern dairy's milk storage room. Use of modern thermocouple instruments has brought a large saving in milk tank clean-up time—and has reduced maintenance and repair bills.*

for the food industry

reduce costs

With labor and raw material costs at all-time highs, progressive food processing plants are turning to modern instrumentation as a means of trimming production and maintenance expenses . . . and boosting quality at the same time. They find that automatic measurement and control give these important savings:

- *More efficient utilization of labor and equipment*
- *Reduction of product loss*
- *Non-stop operation at peak capacity*

An eastern dairy, for example, has simplified supervision and effected savings in clean-up time through centralized recording of storage temperatures. A large food packing plant uses a custom-built control system which permits the same retort to be used for boiling meats and for pressure cooking glass-packed products. Not only does the processing equipment perform this double duty with full efficiency on both types of product, but glass breakage has been eliminated and overall labor costs reduced substantially.

These examples can be multiplied many times over by the experience of plants where labor, maintenance and material costs have been reduced . . . through the application of modern instrumentation.

Let Honeywell help you solve your plant's cost-cutting problems. Call your local Honeywell engineering representative today . . . he is as near as your phone.

Minneapolis-Honeywell Regulator Co., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Penna.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

● *Important Reference Data*

Write for copy of new brochure, "Tomorrow Is Today". . . and request Data Sheets for Specific Food Industry applications.

With This NEW Improvement Niagara "No-Frost Method" puts you a big step ahead in trouble-free, automatic refrigeration or freezing

Niagara "No-Frost Method" keeps frost and ice COMPLETELY OUT of your cooling, chilling, freezing or cold storage.

It uses Niagara No Frost Liquid Spray to keep frost and ice from ever forming. It gives you, automatically, refrigeration with no defrosting, and full capacity NEVER cut down by ice building up progressively on refrigeration coils.

Now, a NEW design No Frost Liquid concentrator, using a new principle, takes away moisture as fast as it is condensed by evaporating it at low temperature—not boiling it away at high temperature. It has 14 times the capacity of the old method per dollar of investment—one concentrator will handle a battery of high capacity spray coolers.

This gives you more refrigeration at lower cost; less machinery in less space. You operate at high suction pressure, saving power and wear and tear on compressors.

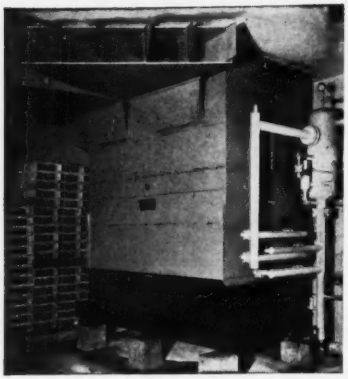
The extra capacity and lower cost both for equipment and operating makes this method advantageous for every type of refrigeration use—both for freezing and for moderate temperatures—for large "live" loads as in meat chilling or in fruit and vegetable pre-cooling—for rooms that are filled and emptied of product daily, such as milk rooms and terminal storage warehouses.

You get true trouble-free refrigeration . . . No brine . . . no salt solution . . . no dirt . . . no mess . . . It is entirely clean; you get rid of dirt and odors. You reduce both equipment and operating costs.

With Niagara "No-Frost Method" you easily keep constant temperature of products in your rooms, improve quality, get more production.

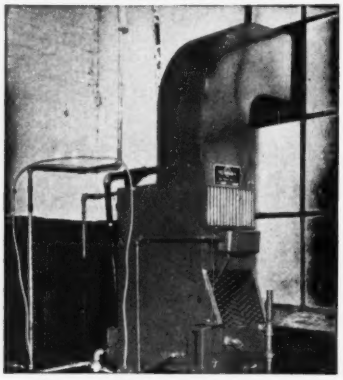
There are two series of concentrators: one, with evaporating capacity up to 6 gal. of water per hour, is economical for small freezing or hardening rooms, milk rooms, single room storage. The other, evaporating up to 36 gal. per hour, serves a battery of large coolers as in multiple floor cold storages, large chilling, freezing or pre-cooling plants.

For complete information write to the Niagara Blower Company, Dept. FI, 405 Lexington Avenue, New York 17, New York.



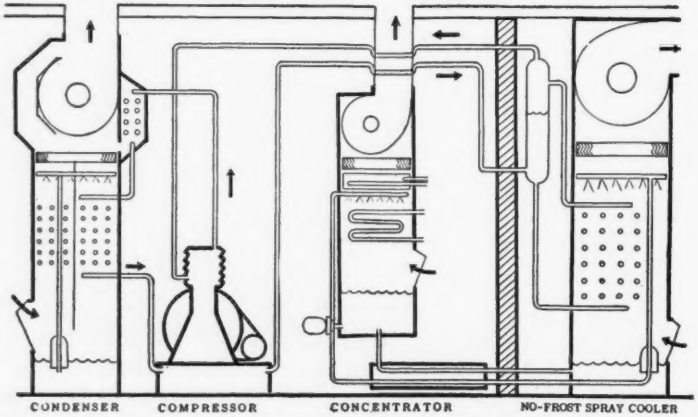
Niagara No Frost Spray Coolers
PATENTED

With the "No-Frost Method" you always get the full amount of refrigeration your compressor will deliver and for which you are now paying. If you need extra capacity, the Niagara "No-Frost Method" can help you get it with your present compressor.



Niagara No Frost Concentrator
PATENTED

No salt solution . . . No brine . . . The Niagara "No-Frost Method" gives you a clean system, clean rooms, clean equipment.



ALCOA FOIL
keeps his fire dry...

There's fire in this small packet . . . chemical pellets that will flare at the flick of a match—heat an entire ration. But to work, they must be kept *dry*.

Alcoa Aluminum Foil, laminated to a waxed glassine paper, does the job. Formed into the packet shown, Alcoa Foil sets up a barrier against moisture, deterioration.

Military applications like this are only the forerunner of greatly improved peacetime packaging in foil and foil laminates. We will be glad to send you names of leading packaging firms—pioneers in the use of Alcoa Aluminum Foil—who can help you with any problems you may have in the field of protective packaging.

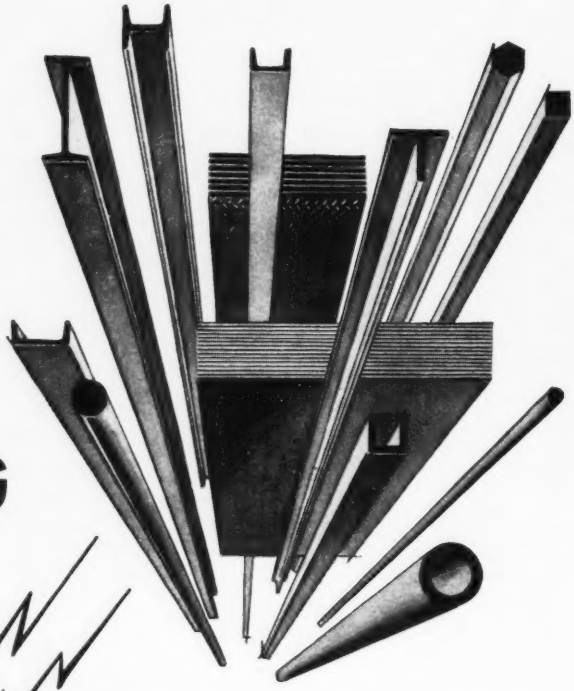
Call your local Alcoa Sales Office, listed under "Aluminum" in your classified phone directory, or write:

ALUMINUM COMPANY OF AMERICA,
1763E Gulf Building • Pittsburgh 19, Pa.

ALCOA

Barrier wrap shown, manufactured by Milprint Corporation for Bostwick Laboratories, Inc.

STEEL for FOOD PROCESSING



In stock...Prompt shipment

We carry a wide range of steel products in our 15 plants strategically located from coast to coast.

A good many kinds and sizes are in short supply at the present time, but we are still able to take care of most requirements.

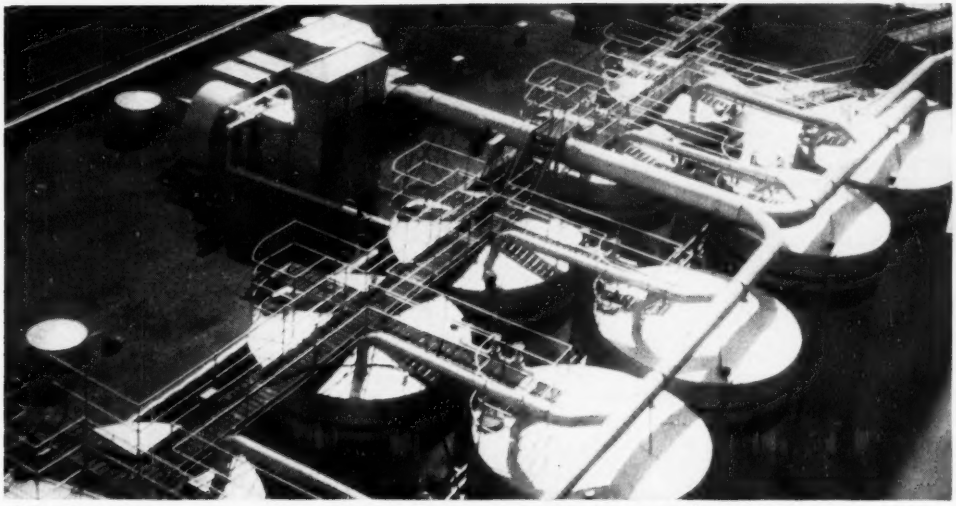
So when you have any problem of steel procurement, application, or fabrication, we will be glad to work with you.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot & cold rolled, many types & coatings
TUBING—Seamless & welded, mechanical & boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
REINFORCING—Bars & Accessories, spirals, wire mesh
BABBITT—Five types, also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

CALL RYERSON

JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SEATTLE • SPOKANE



ONE OF LATEST improvements is forced air circulation system that prevents moisture condensation inside storage tanks and subsequent spoilage of liquid sugars. Tanks are also equipped with germicidal lamps.

Advanced Technics Set Pace In Making Liquid Sugars

More efficient clarifying, improved two-stage decolorization, dual-purpose ion exchange, and better storage-tank aeration reflect strides in processing of top-grade liquid product

D. V. WADSWORTH and P. X. HOYNAK
Vice-President and General Sales Manager, respectively, Refined Syrups & Sugars, Inc., Yonkers, N. Y.

Being pioneering specialists in the liquid-sugar field, we have done more than adopt processing technics to step up production. We have had to improve them many times* in order to produce our liquid sugar—which we hold to be comparable to, and in some respects even superior to, the granulated product.

But overcoming production problems was only half the battle. We were confronted with storing and shipping problems. And food industry users were not equipped to handle liquid sugar. Biggest problem was devising a method for eliminating moisture condensation within storage tanks and subsequent spoilage by microorganisms.

We have worked closely with other food processors, setting up research, and engineering programs and employing, from time to time, outside technologists who are specialists in the various branches of the food industry. Research technicians aid them in processing problems and in the development of new products. Engineers assist users in proper installation of liquid-sugar handling equipment. And members of the sales department—experienced food technologists—advise processors on proper use of liquid sugars in their formulas.

These seven advanced practices have been incorporated into our refinery operations.

1. **Bulk storing of raw sugar in huge bins to minimize caking of product and to reduce labor costs.**

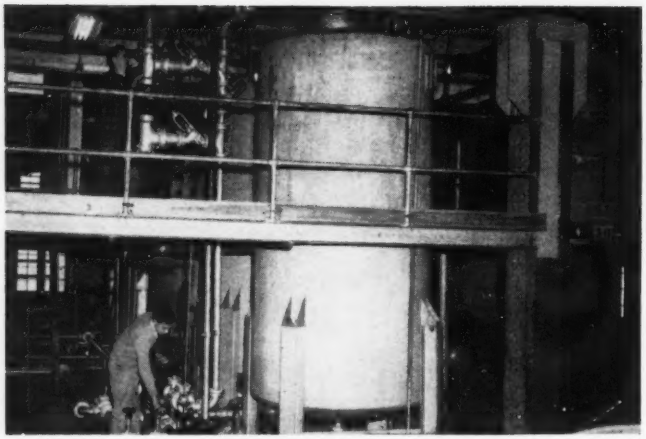
2. **Efficient affination—removal of molasses film from surface of raw sugar crystals by washing and high-speed centrifuging.**

3. Continuous, space-saving melt-

"Diagrammatic Plant Trip"

This month's colorful FE Foldout Flowsheet takes you on a revealing "diagrammatic trip" through the high-performance RS&S liquid sugar operation. For this special engineering closeup, just turn to pages 136-139.

* A basic consideration of the company's processing of the various grades of liquid sugar, their handling, and distribution will be found in the article, "Blending and Distributing Liquid Sugar for All Users," page 96, Mar. '48, *Food Industries*.



ANOTHER step forward is this new ion-exchange system. It produces an ash-free product. Here, too, inversion takes place.

ing units for dissolving washed raw sugar going into "blow-up" or defecating tanks.

4. Improved defecation—use of a lime-phosphoric acid flocculant in conjunction with Jacobs clarifiers, thus eliminating filtration prior to carbon treatment.

5. Use of adsorbents (bone-char and activated carbon) for removing reversible and irreversible colloids.

6. A dual-purpose ion-exchange system—for inversion and ash removal.

7. Forced air circulation facilities, specially designed for storage tanks, barges, and motor-tank ships, to eliminate moisture condensation and thus avoid spoilage.

Let us describe each of these improvements in detail, following the order in which they were named:

1—Bulk Storing Raws

New efficiency has been attained through a speedy method of feeding raw sugar from warehouse to process. Employed are huge storage bins that eliminate conventional bag handling and storing practice.

Now, bags of raw sugar are uprighted onto a belt conveyor, upon which they are opened and then dumped into a hopper feeding a pair of corrugated crusher rolls. Leaving these rolls, the sugar drops into a horizontal worm-screw conveyor, and it is picked up by a bucket elevator going to three 1,500-ton-capacity bins. Flow into the refinery starts by opening slide gates along the bottom of the bins. Horizontal belt and inclined bucket conveyors feed sugar to refinery.

Advantage of storing sugar in these bins is to cut labor costs as well as to prevent caking of the bulk of the raws. Only a small surface crust forms on the pile, while the remainder is free-flowing.

2—Efficient Washing

Installations of a long mingler, a mixer, and high-speed centrifugals represent further improvements for boosting productivity.

Incoming raw sugar is continuously scaled on an automatic weigh-belt that also feeds it into the mingler. Here, affination syrup (raw-sugar washings from centrifugals) is introduced to form, with the sugar, a magma (paste-like mixture). This magma then continues to the mixer, in which steam-heated, rotating spiral coils dissolve (affinate) the molasses film and a small portion of sucrose crystals into a syrup.

Magma is batch-fed into six centrifugals that operate at 1,500 rpm. After the syrup is spun off, sugar is spray-washed with water. A portion of the affination syrup (molasses syrup and wash water) is recirculated to the mingler.

3—Continuous Melters

Still another improvement for raising efficiency has been the installation of company designed melters.

Climb of Liquid Sugars

At first many sugar users were reluctant to switch to the liquid product, due to low quality of the product and lack of adequate handling facilities.

Today, however, these shortcomings have been almost completely eliminated.

New technics facilitating production of quality liquid sugars, were adopted in Refined Syrups' Yonkers plant in 1939. Significant is the passing of liquor through bone-char and vegetable carbons, a practice which, insofar as is known, was never before employed.

And then radical quality-promoting measures were adopted to make it possible to produce ample supplies of sucrose and invert syrups that are equal to and, in many respects, superior in quality to the granulated product. For instance, in the present refining of liquid sugars colloidal matter is more readily removed.

While improvement in the quality of liquid sugars was imperative if the new industry was to survive, equally important was the need of adequate equipment for storing and handling them in the users' plants. This problem was surmounted by our research and engineering departments.

The increase in volume of liquid sugar distribution during the past few years is, in part, due to product improvement.

Following are the significant data:

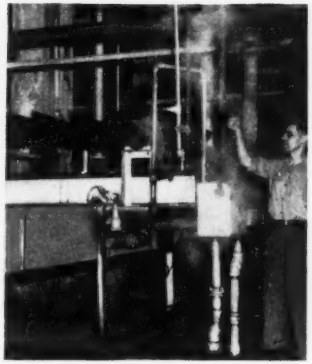
In 1941, the USDA reported cane deliveries to be 5,253,848 tons in dry and 193,917 tons in liquid forms. Dry cane deliveries were 5,386,361 tons and liquid cane 479,918 tons in 1950. Thus, liquid deliveries were 250 percent higher in 1950 than in 1941, indicating a significant trend from dry to liquid. USDA figures on liquid and dry (cane and beet) sugars going to the food industry for the first three quarters of 1951 are given in the accompanying table—*D.V.W. and P.X.H.*

TABLE—DELIVERIES of Dry and Liquid Sugar to Food Industries, First Three-Quarters of 1951 (USDA)

Products	Liquid (100-Lb. Equivalent)	Dry Beet and Cane Sugar (100-Lb. Equivalent)	Total Deliveries
Confectionery	2,062,968	12,313,547	14,376,515
Ice cream	992,913	4,081,090	5,074,003
Beverages	2,577,794	12,538,135	15,115,929
Canned goods	2,738,202	8,271,524	11,009,726
Other foods	1,151,056	4,993,283	6,144,339
Total	9,522,933	42,197,579	51,720,512
Percentage of Total Deliveries	18.2	81.8	.....

OUTPUT "upped" by efficient washing. Raw sugar is fed by weigh-belt (left) to mingler (right), later centrifuged.

IN THIS company-designed melter, washed sugar is dissolved. Operation is continuous. Unit saves space.



PRODUCT PURITY is improved in these clarifiers, following the lime-phosphoric acid defecation step.

Washed sugar is bucket-elevated to two melters—tanks equipped with open-type steam coils for dissolving sugar in hot or sweet water. Overflow from melters passes through fine-mesh copper screens that remove any extraneous matter, such as strings, fibers, and lint.

4—Improved Clarification

Another advanced refining technic is the defecation and clarification process. Defecation—treating sugar liquor with lime-phosphoric acid solutions and then heating it—is the first step.

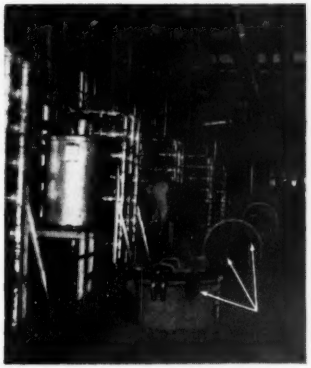
Liquor flows into five blow-up tanks, equipped with vertical, propeller-type agitators. Here, measured amounts of slaked lime and phosphoric acid solutions are added to form a flocculant.

Clarification follows. Temperature of the liquor is raised to 160 deg. F. in a tubular heat-exchanger. And further heating in the jacketed Jacobs clarifiers coagulates and precipitates most of the pectins, gums, and albumins. Moreover, the flocculant absorbs and occludes colloids and suspended matter, thus facilitating removal action in the clarifiers.

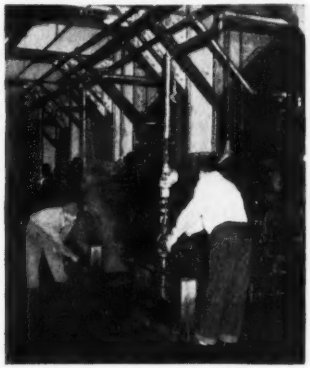
As a further aid, the treated liquor is aerated in rotary-type units before it enters the clarifiers via head tanks. Separation of the tri-calcium phosphate floc, plus impurities, is accomplished by air flotation.

As liquor flows through the clarifiers, air bubbles rise, expand, and carry along with them the flocculant and occluded matter to form a scum. Chain-driven skimmer paddles remove the scum, which is diluted and fed to a receiving tank and aerated. Treated scum goes to a secondary clarifier, and the resulting sweet water is used for dissolving washed sugar. Scum coming from the secondary clarifiers is further diluted and filtered to produce more sweet water.

Sugar liquor discharged from clarifiers passes over a vibrating screen that removes stray particles.



COLORING and other foreign matter are removed as liquor percolates through bone-char beds (arrows).



BY further treating liquor with activated carbon and filtering (above), additional decolorization is achieved.

5—Double Decolorization

Adoption of a bone-char and activated carbon method of removing other impurities and coloring matter was another notable improvement. This dual treatment was designed to produce a water-white product demanded by certain users.

Here is how the liquor is treated in bone-char beds: A char and liquor slurry is introduced into cast-iron tanks measuring 10 ft. in dia. by 20 ft. high. Slurry is prepared with once-filtered char liquor to increase the working time of a bed 5-6 hr. Beds made up with dry char not only require additional settling time, they also have a tendency to segregate and cause channeling.

About 40 tons of char are used per filter, with approximately 6,600 gal. of liquor filling the voids. There are 15 filters in service. Each is used three to four days before being sweetened off and revivified. Two beds are regenerated every 24 hr.

A filter-bed cycle takes about three days, during which time seven operations take place: (1) The bed is filled with slurry, (2) liquor is introduced, (3) syrup runs through the bed, (4) filter is sweetened off, (5) the bed is washed with hot water, (6) residual water is blown out, and (7) wet char is revivified.

Decolorizing and clarifying is a two-

stage operation. Liquor is percolated to the first-stage beds at the rate of 26 gal. per min. It is then pumped to an overhead tank, from which the liquor is gravity-fed to second-stage beds at the rate of 40 gal. per min. per bed. In all cases, newer beds are used to decolorize once-filtered liquor, which is usually refined into liquid sugar. Liquor for granulated sugar is filtered through older beds.

Now to the activated carbon treatment: To achieve additional decolorization, liquor is treated with activated carbon. Effluent from bone-char beds is pumped to six 4,000-gal. tanks and mixed under 30 psi. with a slurry of vegetable carbon and sweet water. From here, the slurry is pressure filtered through five rotating auto filters, each equipped with 36 leaves provided with separate inlets and outlets. Each unit has 900 sq. ft. of filtering surface and rotates at 2 rpm.

As a precautionary measure, liquor is next pumped through trap filters that remove any traces of carbon particles. These filters are precoated with filter aid, and they operate under a maximum 30 psi.

Liquor to be refined into sucrose liquid sugar is brought to 67 Brix in single-effect evaporators, cooled in a heat-exchanger, filtered, and pumped into storage tanks.

6—Ion-Exchange System

In the recently installed ion-exchange beds, two steps take place—(1) ash is removed to produce a better quality product, (2) inversion occurs.

Automatic instruments control temperature and flow of liquor percolating in series through two cation columns. To prevent metal pick-ups, pipes, valves, fittings, and columns are rubber-lined. Employed is a synthetic, phenolic-type resin.

The pH at the start of the cycle is about 1.8, and it gradually increases to 3.0 (the break-through). At this point, flow of liquor through the cation beds is stopped. Beds are then washed and regenerated with 32 percent hydrochloric acid in dilute solution.

A bed runs 24 hr. before it is regenerated. It takes about 3 hr. to regenerate a bed. Percent inversion depends upon the freshness of a bed. Liquor percolates through a bed under 20 psi. and at a rate of 20 gal. per min.

Liquor is now pumped from cation beds into a 6,000-gal. holding tank. If higher inversion is desired, effluent from these beds is raised from about 115 to 160 deg. F. in a helio-flow heat-exchanger, and then held in the holding tank.

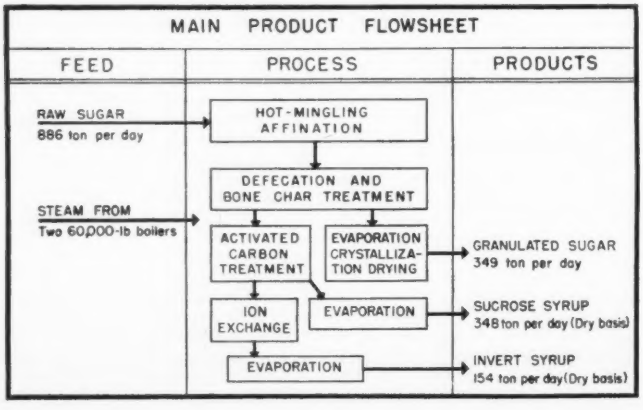
Now the liquor is cooled and fed in series through two anion beds. Initially, effluent from these beds has a pH of 8.0. Beds are regenerated with dilute caustic soda solution when the pH drops to 6.0.

From anion beds, liquor is pumped into three 6,000-gal. plastic-lined tanks. Liquor is then concentrated at the rate of 3,500 gal. per hr. into a 76-Brix syrup, which is cooled, filtered, and pumped into storage tanks.

7—Storage Aerating

Control measures are exercised in maintaining the quality of liquid sugars held in storage tanks. Employed is a forced air circulation system designed, as stated, to curb moisture and thus spoilage.

Air is filtered through cotton wadding and passed around a battery of ultra-violet lamps before entering the circulating system. Storage tanks are also equipped with u-v lamps for arresting the growth of possible spoilage organisms. Moreover, tanks are emptied and filled in rotation. Empty tanks are washed, sterilized with quaternary ammonium compounds, and rinsed with cold water.



Quality Control

As in the case of any food, quality control of granulated and liquid sugars starts with the raw material, then extends through meticulous regulation during refining, and culminates in the analysis of the final products.

With respect to the control of raw sugar, analyses are made every 8 hr. for moisture, color, and invert sugar. Normal moisture content runs about 0.5 to 0.9 percent, and the invert content averages 1 percent.

Refining processes are regulated on the basis of analysis of products in process by the quality control laboratory. And analyses are made at ten major stations during refining.

First check is made on washed raw sugar discharged from centrifuges. Analyses are carried out on color and amount of invert sugar as a check on the efficiency of the washing operation. Affination syrup is also gaged for sugar and total solids as a test against re-introduction of impurities into raw sugar at the mingler.

As a check on the purity of sweet water introduced at the melters, liquor going to the blow-up tanks are analyzed for invert sugar, degree brix, and color.

Running pH's

Repeated checks are made on liquor in blow-up tanks (where lime and phosphoric acid are added) to keep the pH in the neutral range. Reasons: A pH below neutral causes inversion, a pH above neutral results in discoloration, and a neutral pH brings about maximum tricalcium phosphate precipitation.

Effluent from the clarifiers is tested for pH, color, Brix, and invert sugar. Inaccuracies in the addition of lime and phosphate at the blow-ups are checked by pH determinations and the amount of chemicals is accordingly adjusted. Percent color removal reveals the efficiency of the clarifying process.

Liquor leaving the second-stage bone-char filter is checked for Brix, color, invert sugar, and pH. Liquor, as stated, is diverted to granulated-sugar production. The pH figure is used to determine the temperature to employ in revivifying spent bone-char. High revivifying temperatures will increase the pH of syrup running through the char filters and thus decrease the amount of invert sugar.

Activated carbon-treated syrup is analyzed chiefly for Brix, color, and invert sugar. As mentioned, syrup with

(Turn to page 153)

1930
Hardly 500 Researchers

1952
6,400-Plus

Food Research Zooms

GEORGE PERAZICH
Engineering Associate, Straus & Perry, Management Consultants, Washington, D. C.

Today, food research is expanding with considerable rapidity. In 1951 there were about 6,400 scientists and auxiliary personnel working in laboratories supported by processors of foods and allied products.

Altogether they spent about $38,000,000 for the development of new and improved products and for adaptation of such products to consumer use.

This information and the analysis which follows comes principally from a series of surveys of industrial research laboratories compiled by the National Research Council.*

Although in relation to size the food industry lags behind many other important industries on this particular score, the rate of growth of its research staffs during the past two decades has been pronounced. In 1930 not more than 500 people were engaged in food research as compared with 2,800 ten years later, and as stated above, about 6,400 last year (see Table I).

The most rapid expansion occurred in the 1930's when food research staffs increased fully five-fold. This sudden growth in research was due perhaps to the depressed economy and sharper competition, a period during which the need for the development of new and improved products was felt most keenly.

As there is usually a lag of several years from the time laboratory scientists develop new or improved products and their actual appearance on the market, the results of such research, especially that connected with frozen foods, were more apparent in the 1940's.

Increases in food research staffs are but one measure of growth; the ratio of such staffs to the total number of workers engaged in production is another. According to this yardstick also, important progress was registered.

Solid Rises

Between 1927 and 1937 the ratio of total research personnel per 10,000 production workers increased from 6 to 16 or a little more than 18 percent per year. On the other hand, in the interval between 1937 and 1950 the increase was from 16 to 50 representing an average gain of 16 percent per year. This may be compared with 9 percent and 14 percent, respectively, for the chemical and petroleum industries.

When compared to the value of output, the increase in research expenditures was also significant. Whereas in 1927 such expenditures represented only 0.02 percent of the total value of goods produced, in 1950 more than 5 times this amount was spent.

As indicated in Table II, processors of packaged food products employed more than 18 percent of all the people engaged in food research in 1950. Eleven companies supported staffs of more than 1,100 scientists and assistants, of which some 760 were employed by General Foods, Standard Brands, and Best Foods. The large distributors A & P and Kroger supported research staffs of about 130 people. And the four beverage concerns Anheuser-Busch, Pepsi-Cola, Hiram Walker, and National Distilleries had about 180.

Meat and byproducts processors maintained research staffs of about 975 people, nearly 900 of whom were employed by the packers Armour, Swift, and Wilson.

In the dairy products field most of the research is done by the National

(Turn to page 150)

TABLE I—GROWTH of Food Research, 1930-1951

Year	Research Staffs: All Companies	Research Staffs: 8 Identical Companies
1930	500	228
1940	2,800	900
1950	5,800	2,400
1951*	6,400	2,560

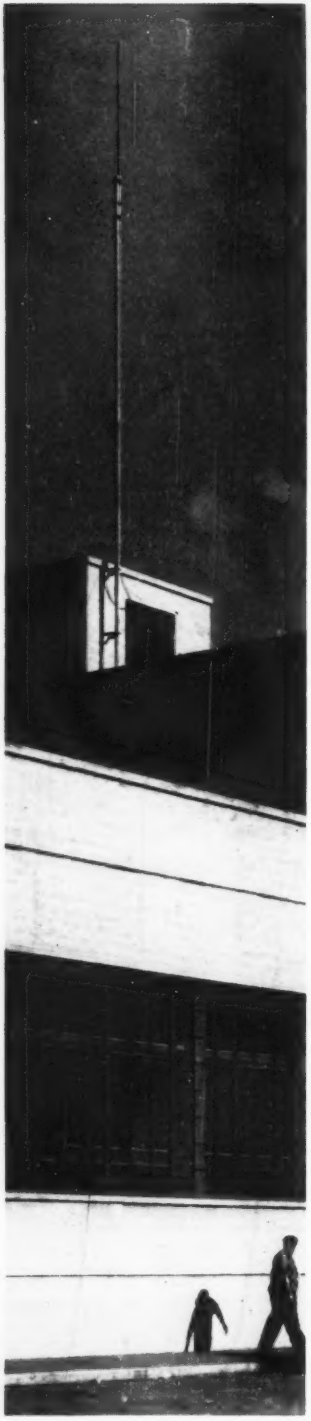
* Estimated

TABLE II—RESEARCH STAFFS by Type of Products, 1950

Type of Products	Number of Companies	Laboratory Personnel
Packaged products	11	1,133
Meat & byproducts	6	975
Flour & cereals	10	862
Dairy products	11	591
Vegetable oils & byproducts	6	559
Canning	7	379
Sugar	10	238
Other miscellaneous*	..	1,061
	Total	5,798

* Including some concerns maintaining small staffs working on the above products.

* Now published by the NRC in book form under the title, "Industrial Research Laboratories in the U. S."



"A motor's down" ⟶

Bill Sharlock, assistant foreman of electrical shop, calls in about faulty motor, requests it be picked up immediately for necessary repairs.

"Calling Fork-Lift 39" ⟶

Marilyn Kocher, system's dispatcher, radiophones Sharlock's request to fork-lift truckman who's in vicinity of motor that's "down."

"MIKE"-SPED MAINTENANCE

Two-Way Radio System Pays Staley These 5 Cost-Saving Benefits—

1—*Speeds* upkeep and repair service throughout multi-building plant.
2—*Minimizes* down-time of vital machinery.
3—*Curbs* costly stand-by idleness of maintenance crews.
4—*Reduces* expensive mileage by short-cut routing of service units.
5—*Conserves* cost of two trucks, with smaller fleet handling same work load.

CHARLES F. GEBHARDT
Maintenance Division Superintendent, A. E. Staley Mfg. Co., Decatur, Ill.

The minute any line equipment "goes down"—then costly dollars in lost production time start ticking off. Hence, greatest speed of the best service must be the objective of the maintenance department.

Here at A. E. Staley Mfg. Co., in Decatur, Ill., we have met that speed objective by adopting two-way radio.

⟵ Flashes service calls

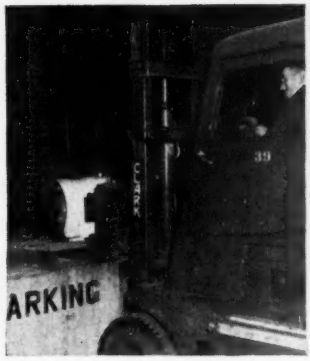
Radio mast atop Staley's new mechanical-shops structure marks center of communications system that whisks service to 108 buildings.

On maintenance, we operate from a single department to service the multiple production units of our 400-acre plant. There are a total of 108 buildings, and while our new maintenance facility is fairly well centered on the plant site, some of these many plant structures lie almost a mile distant. Such a spread would seem to nullify the over-all advantages of even the best equipped central maintenance.

To accelerate the service and mesh it with the call for maximum production, we made our start with two-way radio back in 1949. And today we have a network consisting of a central station and a fleet of mobile radio units.

"Okay! I'm on the way" →

Fork-liftman Paul Fawcett catches call while traveling between buildings. He acknowledges order, then hastens to indicated plant to get motor.



"Have it!" →

Palleted and placed on plant dock, motor is quickly picked up by Fawcett's lift truck. A fast back-out and turn, and he is off to the . . .

—And mission's completed

. . repair shop, where Electrician Frank Koshinski, on hand with tackle, takes motor. Fast trick—from request to repairs in just a matter of minutes!

What this communication system has accomplished in the way of improved service and dollar savings is most notable. The major benefits are spotlighted in the 5-point list already tabulated above.

Use Variety of Vehicles

The radio station is set up in the garage of our centrally located maintenance building. Licensed by the Federal Communications Commission, with the call letters KSA-419, it is "on the air" Monday through Saturday from 7 A.M. to 3:30 P.M.

Just 9 of the maintenance division's 32 vehicles are equipped with the two-way radio sets. For with many of our trucks operating on a definite daily schedule, it is unnecessary to so equip all units. Radio communication is primarily of value in those situations where most effective maintenance hinges on quickest action in response to latest calls or changes in instruction.

The 9 radio-equipped vehicles include 2 Karry Kranes, 1 Clark tractor with fork-lift, 1 Dempster Dumpster, and 5 automotive trucks. All radios are 7w. Motorola units with small speakers and hand-operated "mikes." The central station is a 60w. unit.

System In Action

Responsibility for assigning work to the mobile units throughout the day rests with a dispatcher who is the holder of an FCC radio-telephone license. This young lady receives calls for service from all parts of our broadly spread plant and quickly assigns the trucks most applicable—judging as to nearness, freedom to work, and specific ability to take care of the jobs.

Here's a good example of how the system operates: A foreman phones in that a conveyor motor has broken down—an emergency which can be very costly. The dispatcher then makes radio contact with an electrical repair crew working elsewhere but on a "non-rush" job. And directly these repairmen are off in their truck to the scene.

If these crewmen should find, on arrival, that this motor cannot be handily repaired, they radio this fact back to the dispatcher. Immediately, she puts through an order for a replacement motor to be taken out of warehouse stock and placed on a tractor wagon for transfer. She then locates a nearby radio-equipped mobile unit which can pick up the tractor wagon and rush the motor to the repair crew.

With radio speeding activities on the above job, the odds are that the replacement will arrive before the repair crew has the old motor off its base.

Quite a difference from the old system! Then, such a breakdown would have first entailed several phone calls and finally the sending of someone to hunt down a specific repair

(*Turn to page* 186)

On the Spot With a Sprocket . . .

"Not long ago we had a dramatic illustration of how our radio network meets a plant emergency. A new sprocket was needed by one of the soybean extraction plants to replace one whose imminent failure threatened to hobble us with a lengthy production interruption.

"To obtain a replacement, a truck was immediately sent off to the sprocket manufacturing plant—in Indianapolis, some 200 miles away.

"Even if the new part arrived before the one in use broke down, inevitably there would be lost production time during the period the replacement was installed. It was maintenance's problem to keep that down-time to a minimum.

. . . Radio Gets Them Off

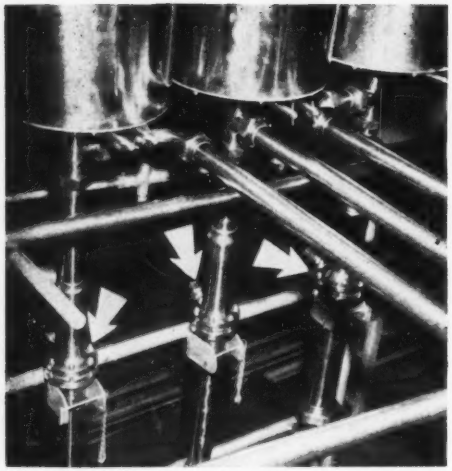
"Through use of the two-way radio system, production lost only 45 min.!

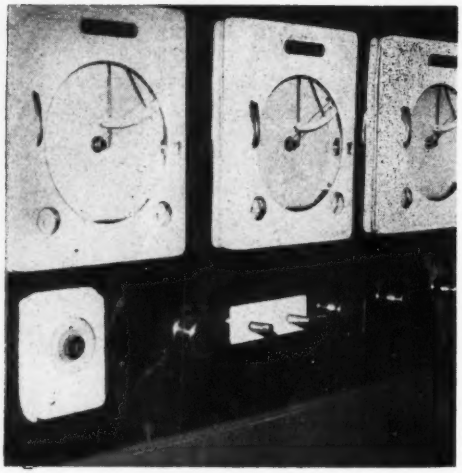
"Here are the details:

"When the truckmen returning from Indianapolis with the new part reached the city limits—several miles from our plant—he radioed his location to the dispatcher, and his subsequent arrival at the soybean plant was figured almost to the minute.

"Instantly, a crew was radio-dispatched to the soybean plant—and had the old sprocket off by the time the truck arrived with the new one.

"Company officials figured that at least several hours of top-dollar production time of a 400-ton-a-day plant had thus been saved."—C.F.G.





THREE MEASURING devices and remote instruments that control their operation. Left: Meters (arrows) continuously feed liquid ingredients as required to provide ice cream mixes of desired formulas. Right: Recorder-controllers that automatically regulate the three meters. They are coupled together to proportion flow of products in a predetermined ratio, and stop the flow when desired quantity of each ingredient is delivered.

Switching to Continuous?

Here Are Practical Tips From a Pioneering Plant

—which by astutely tying together a liquid-meter system, frozen cream units, and short-time heaters now makes ice cream mixes "non-stop"—thus upping output, saving space, and cutting labor

ROBERT K. LAWHORN

Chief Chemist, Abbotts Dairies, Inc., Ice Cream Division, Philadelphia

Recent advances in food-industry technics are affording exceptional opportunities for the processor by opening the door wide to three-fold improvement—increased production efficiency, better product quality, and reduced labor costs.

Here at Abbotts Dairies we've had our eye on that door. And we've noted particularly that these major strides frequently are best combined by making a change to continuous processing.

Streamlining of our ice-cream mix operations was a specific objective. Accordingly, we gave much time and thought to evaluation of the various tools and methods which might be applied. And this study led us to a revision which quickly proved its effectiveness by paying these benefits:

- **Marked savings in cost of transporting and handling mix-making ingredients.**
- **An increase in production capacity without need for extra floor space.**
- **A reduction in man-hours per gallon of mix made.**

Also, a future big benefit will be a further increase of at least 50 percent in output when short-time high-temperature pasteurization is adopted.

How System Was Devised

An important cost factor in the manufacture of ice cream mix is transportation of the fat and milk solids-not-fat from country plants. Here, we were able to effect large savings by converting the milk to 80 percent cream and condensed. The cream is filled into 20-qt. single service containers, immediately frozen, then held in that state until used for mix making.

Condensed is transported in tank trucks and pumped to large storage tanks on the top floor of our plant.

A saving was also made in the cost of sugar by switching from 100-lb. bags to liquid sugar. This is also delivered in tank trucks and pumped to large tanks on the top floor.

But these changes, from cans and bags to bulk, eliminated our previous means of determining accurately the quantity of ingredients being used in a batch of mix.

We considered installing a weigh tank in which to collect the products by batch units, but found that the cost of required changes in building and equipment was

excessive. Then, too, this arrangement would not have been an entirely satisfactory solution to the problem.

Continuous Mixing Adopted

High-temperature short-time pasteurization of the mix would enable us (as previously mentioned) to attain a considerably greater volume of production than would changes in the present holding system. So, although this method of pasteurizing is not yet accepted by certain Boards of Health in our area, we decided to install a continuous mixing and heating system to supply the 500-gal. holding-pasteurizers. This equipment would make later conversion to the HTST system a simple, inexpensive matter.

Flowrators were installed to measure and control flow of the three liquid ingredients—condensed milk, liquid sugar, and fluid milk or water. These units have a range of accuracy between 1 and 2 percent and are of sanitary design that meets health department standards.

At the same time we added two supply tanks, a 40,000 lb./hr. Ste-Vac heater, and internal tubular preheater. A specially designed frozen cream incorporating unit was also included in the new system.

This latter machine consists of a hydraulic piston that forces the 20-qt. cylinders of frozen cream against a spinning blade which reduces it to a flaky, easily melted product that is readily dispersed when it drops into a stream of warm mix-making ingredients.

An attachment to this machine slits the paperboard container to facilitate its removal from the cylinder of frozen cream. Frozen egg yolk and chocolate liquor are also processed through this cream-incorporating machine.

Each of the three metering devices (see photo) that make up the ingredient proportioning unit has its own recording and totaling or counting instrument. By means of a mechanical linkage, total flow of the three meters can be increased or decreased to synchronize their flow with the mixing operation as a whole. An automatic timing device shuts off the flow when the desired quantity of each ingredient has been delivered.

As a safety measure, an additional control was incorporated in the set-up to shut off the flow through the three meters in case any of the products fails to maintain the desired rate of flow.

How Metering Devices Work

A Flowrator is comprised of an enlarged stainless steel section inside of which is located an hermetically sealed transmitter capsule, and a cone-shaped metering tube containing a float assembly. A small smooth-surfaced hole extends vertically through the center of the capsule.

The capsule contains a pair of induction coils that form two legs of an impedance bridge of which the other two legs are located in a remote instrument that electronically detects and amplifies the current flow across the center tap of the bridge circuit when the primary and secondary impedance coils are not in balance.

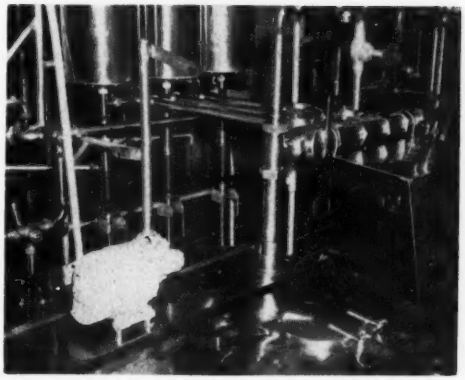
The float assembly is comprised of a head (that rises in the metering tube as the flow rate increases, and falls as it decreases) and a small tube that extends down into the hole in the transmitter capsule. Sealed in this tube is a tiny piece of magnetic iron.

The product to be metered enters the bottom of the unit and moves upward around the capsule and, also, through the small hole in its center. It then enters the metering tube, and after passing the float head discharges through the outlet in the top.

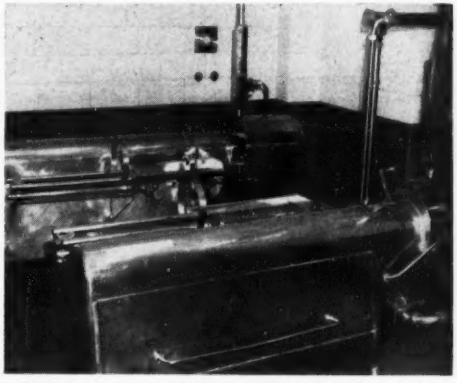
As stated earlier, the float assembly moves up and down in response to the automatic controller. When the

(Turn to page 155)

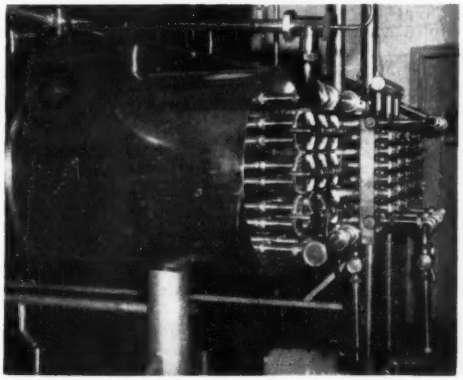
Mix-Making Sequence



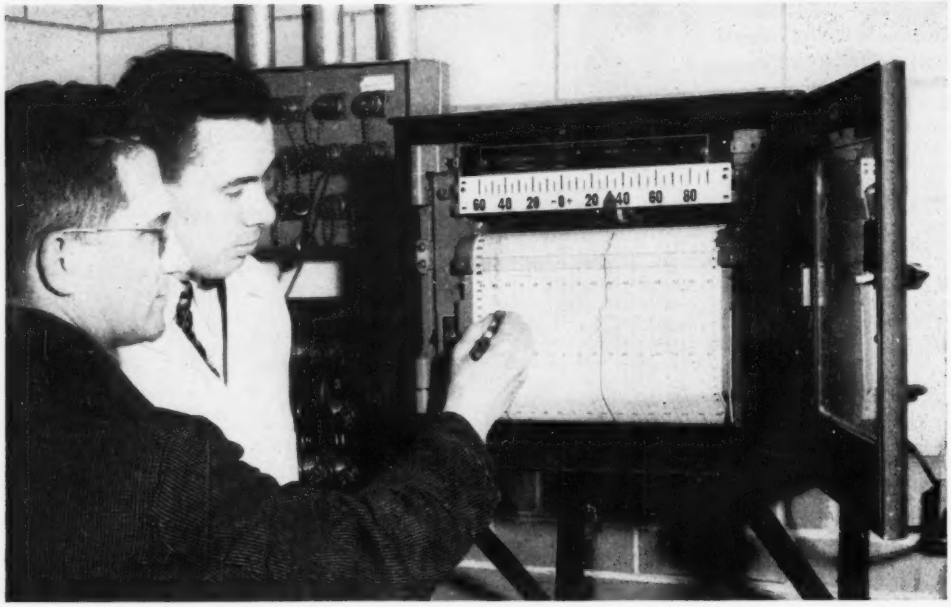
MILK, condensed, and liquid sugar, from storage tanks on floor above, flow through meters (background) and into one of the two heater supply tanks (foreground). From here, mixture is pumped through tubular heater to cream room.



CREAM incorporating units quickly reduce frozen fat to flaky product, which is easily melted when it drops into stream of warm mix ingredients from preheater.



STE-VAC heater (foreground) raises temperature of mix to 170 deg. F. as it is pumped to holder-pasteurizers. Preheater may be seen in background.



1 **GRAPHIC ANALYSIS** is getting new results in chilling, freezing, conditioning rooms. This Wilson installation serves seven areas through switchboard.

Instruments *Catalyze* Progress

Enable meat packers to put technology to work in advanced processes for better quality and lower costs. Pinpoint variables, avoid error

LLOYD E. SLATER
Assistant Editor, "Food Engineering"

Instrumentation is proving itself a basic tool of advanced process engineering in the meat packing industry. It is enabling plant management to enforce the precise processing values and conditions long championed by the researchers. And what amounts to an industry-wide trend to advanced instrumentation is under way—a trend which can and should be emulated by other food processors.

Besides re-engineering old control systems for higher precision, packers are exploiting recent instrument developments to an unusual degree in their plants. Among these lesser known technics are:

- **Dynamic graphic analysis of related process conditions.**
- **Programming of smoking procedure to make it fully automatic.**
- **Use of sensitive electric hygrometers in process-humidity control.**
- **Direct regulation of processing from inside-product readings.**
- **Supervision of rendering through electronic end-point control.**

Before exploring these comparatively new technics, let us first consider how and why many standard, long-used control systems are being re-engineered in the light of more exacting process demands.

Scalding Is Scrutinized

A logical place to start is at the scalding tank. Why are more and more packers replacing seemingly adequate self-contained controllers with individual remote-bulb instruments and air-operated valves?

The answer here was provided by the analytically minded chap who refused to believe that the older control units were holding scalding temperature within a few degrees—as checked directly at the thermal bulb.

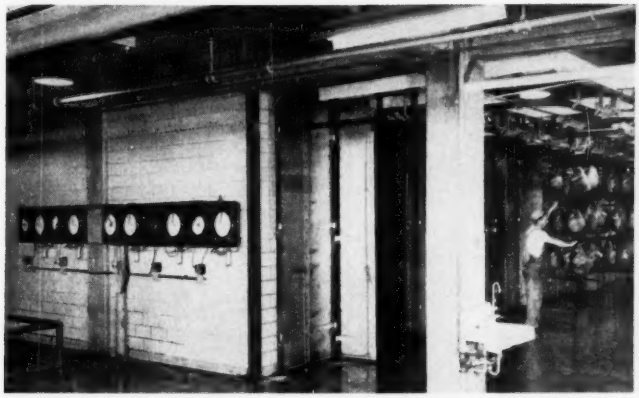
Instead, he took several test thermometers and logically spotted temperatures all through the tank. And the results that he got wandered over a staggering 10 deg. F.

It was soon discovered that the secret of scalder control is to employ an averaging thermometer bulb which extends tank length and thus is sensitive to regional variations. Surprisingly, an on-off control action is desirable in the instrument. This allows high-pressure surges of spreader-pipe steam to penetrate and heat far reaches of the tank. A proportioned dribble of steam usually results in a localized overheating.

What has resulted from re-engineered scalder controls?

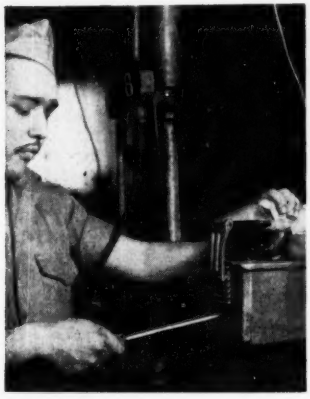
Take improvements in this operation at the A. C. Roberts plant in

Spur Progress in Meat Packing

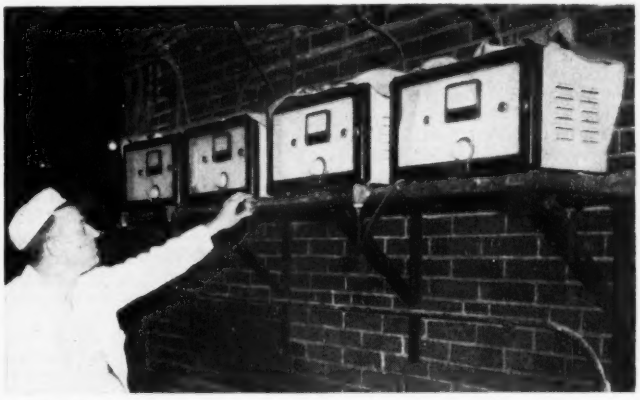


2 PROGRAMMED smoking is robotizing the most complex smoking schedules to reduce shrinkage and improve meat quality. This bank of cam-set controllers at Morrell, neatly installed along the wall for convenient operations, handles five houses. (Powers Regulator photo)

3 ELECTRONIC hygrometry is dealing with critical humidity problems. This Foxboro "Dewcell" measures fast-moving air in cooler at Armour.



4 IN-MEAT measurement is pinpointing process values, Schluderberg-Kurdle worker inserts 'couple in ham mold. (Brown Instrument photo)



5 END-POINT control is boosting lard yield and improving quality in dry rendering, an operation requiring close attention when manually controlled. This shelf-mounted instrument bank, conveniently positioned for ease of setting and reading, controls four cookers at Krey Packing.

Kimberton, Pa. Previously, a laborious amount of hand shaving was an accepted fact at this plant. Now, with 2-deg. F. control throughout the scalding tank, complete hair removal is achieved by mechanical means. Hand shaving is practically out.

Other carcass-handling operations have been similarly re-evaluated. For example, hot makeup water for washing beef and hog carcasses now is regulated within 1-deg. F. in many plants. This is done with air-operated controllers and diaphragm-motor valves. Variations of only a few degrees would cause an undesirable setting or softening of the fat, particularly with high-pressure sprays.

Improved controls also are being fitted to the ham boiler because temperature variations of only a few degrees result in weight shrinkages as high as 15 percent.

Most packers believe that a gradual increase and then decrease in cooking temperature provides better control of flavor as well as shrink. Such an approach suggests a recording controller with an exact control-point setting knob.

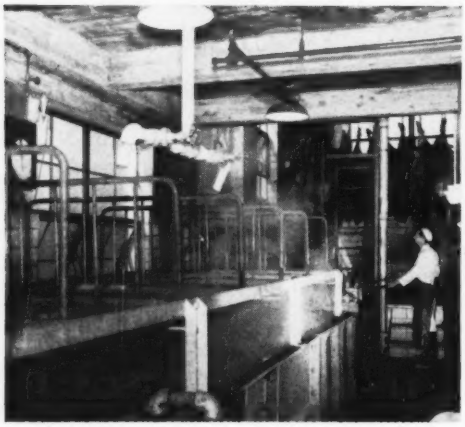
Furthermore, a throttling, rather than a surge-type control action is needed, since the latter would cause sizable temperature overshoot in the small boiling vessel whenever a control setting is changed.

Some plants ease the job of the controller—and vastly improved its performance—by adding a cold-water supply line to the ham-boiling tank. A control valve on this water line, working reciprocally with the steam-control valve, gives the instrument exact command of temperature at any point in the boiling cycle. The steam-valve spring is set to cause full closure as the instrument reaches the control-setting output-air pressure. The water valve is set to start opening as temperature climbs above the control point.

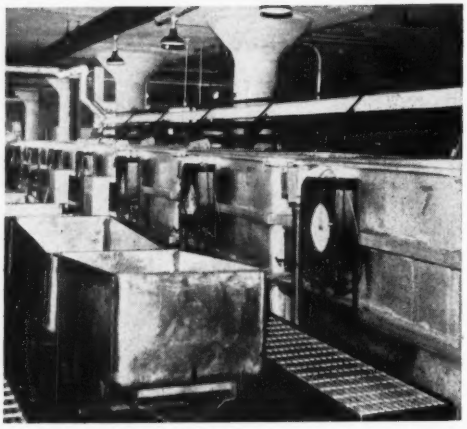
At John Morrell's Sioux Falls plant, 50 tanks are equipped with identical air-operated throttling controllers, all functioning efficiently in a routine, engineered process.

Perhaps the most tangible gains afforded by modern meat-plant instru-

Control Pays Off in Scalding and Ham Boiling



RE-ENGINEERED SCALDER control system has all but eliminated need for hand shaving carcasses at A. C. Roberts plant. (Brown Instrument photo)



FIFTY UNIFORM CONTROL systems on the ham boiling tanks at Morrell plant are engineered to hold a quality-oriented schedule. (Taylor Instrument photo)

mentation lie in what the control engineer is prone to call "atmospheric processing"—chilling, smoking, drying, curing, quick freezing, and cold storage.

A good example is provided by the growing use of unit coolers in carcass chilling. Precise humidity control was next to impossible in the older spray-deck systems because is was difficult to balance brine temperature against a desired air circulation. Unit coolers, on the other hand, are furnished with integrated controls which regulate the temperature of brine and air discharge, and also the back pressure of ammonia.

It is estimated that the holding of temperature and humidity to within 1 deg., along with improvements in air circulation, can reduce shrinkage in the chill room from its previous average of 3 or 4 percent to 1 percent or less.

Graphic Analysis

Analyzing the effect of process-air distribution formerly meant endless gathering of data from thermometers spotted throughout processing areas—in air and carcass, as well as brine and outside air. Today, this vital information is automatically plotted on one calibrated chart by using a multiple-record electronic potentiometer and thermocouples.

Having a running record of factors affecting a process *while operating* permits immediate spot improvement and speeds the processor along the former time-consuming detailed path to progress.

A brilliant example of the use of this technic is in operation at Reliable Packing Co.—a system designed and installed by President John Thompson. Each unit operation in this plant is tabulated—through action of Microswitches and an integrator—on a multiple-recorder in Thompson's office. This instrument thus provides graphic analysis of processing operations as they mesh together. And it allows immediate trouble shooting should any unit operation be out of phase with other plant activities. A brief glance at its chart record is, so to speak, an electronic appraisal of overall plant efficiency.

Multiple-recording has also become a vital tool in freezing and prefabricated-meat conditioning rooms. Wilson & Co. has an excellent setup in a freezer pilot plant which features a concealed network of permanent thermocouple leadwire running to plug-in terminals set inside six processing rooms. A central switchboard allows the recorder to be tied into any measuring circuit to scan temperatures in that location.

One bonus from Wilson's system has been its pinpointing of precutting temperatures for various prefabricated meats. As many packers have discovered, frozen meat must be conditioned to an exact temperature for successful slicing operations.

Precision Smoking

Ask a progressive meat-process engineer to show you the outstanding recent instrument improvement in his plant and chances are that he will point to a smokehouse.

Widespread adoption of quality-oriented air-conditioned smokehouse equipment has made the industry conscious of gains possible from precision temperature, humidity, and air-circulation control. So most smokehouses are being equipped with tightly engineered instrument systems to enforce this new, critical, industry approach to an ancient food-preservation method.

The criterion of a good smokehouse control system is its ability to work under any set of operating conditions. Mainstay of such a system is usually a wet-and-dry-bulb recording controller which offers knob-set control action over a range of 0 to 100 deg. F. wet-bulb depression and 30 to 220 deg. F. smoking temperature.

Having a simply adjusted, flexible control system permits a smokehouse operator to set up just about any drying, smoking, and cooking schedule which technologists have found to give minimum shrink and optimum color.

In forced-air smokehouses, the wet-and-dry-bulb assembly usually is located in the exhaust duct to measure *what has been done* to the atmosphere by the process. Lately, some packers have built little airtight, dust-proof enclosures for the bulb assembly. Supplied by exhaust air from the smokehouse through pipe, this cabinet can be mounted external to the process for easy maintenance.

Smokehouse temperature practically always is regulated by an air-operated valve in the steam-heating line, or in the gas-supply line if this fuel is used for heating. Humidity usually is controlled by a dual action. A valve throttles steam to air sprays when humidity is low, and an automatic

damper operator admits dry, fresh air into the process when humidity becomes excessive.

Recently, this basic control system has been augmented by a static-pressure regulator. Pressure changes due to automatic damper movements have been found to upset proper air motion in the smokehouse. An inexpensive non-indicating pressure control limits such fluctuations by positioning a damper in a positive-exhaust duct.

Schedules Programmed

While knob-set control of a complicated smoking schedule has proved to be a bonanza to many packers, it still requires fairly conscientious attention from a well-trained attendant. For best results, some meat products may require 20 or more changes of control setting during a smoking period running 6 hr.

To eliminate this constant supervision and put smoking on a robot basis, a few packers have taken advantage of program instrumentation. This involves reproducing the temperature and wet-bulb schedules for a given product on two metal charts which are cut into cams with a pair of tin snips. The cam schedules are then located in a transmitting instrument which *automatically* positions control-point settings in the smokehouse controller.

With the smoking schedule programmed, an unskilled worker pushes a button and instruments do the rest.

One of the pioneer users of program smoking is Martin Rosel's plant in New Britain, Conn. Here, a skillfully engineered instrument system is integrated with a modern air-conditioned smokehouse which is complete with its own smoke generator. The advanced combination is giving this company what it calls "the best looking sausage it has ever produced . . . and with absolutely no manual attention."

Focusing on Humidity

Adoption of unit coolers capable of blowing fast-moving controlled air through a processing area has allowed packers to come up with some interesting discoveries. For one thing, the use of such equipment has disproved the old theory that rapid chilling causes excess shrinkage. Many report much less shrinkage from new fast chilling, cooling, and drying systems.

On close appraisal, it is obvious that the success of forced-air processing stems from close humidity control. Instrument control of refrigerant to a spray-type dehumidifier is an unusually precise way to keep that variable at a fixed value. Thus, process-air humidity can be held at a high, shrinkage-inhibiting level. And at the same time, the rapid air movement prevents the development of surface mold.

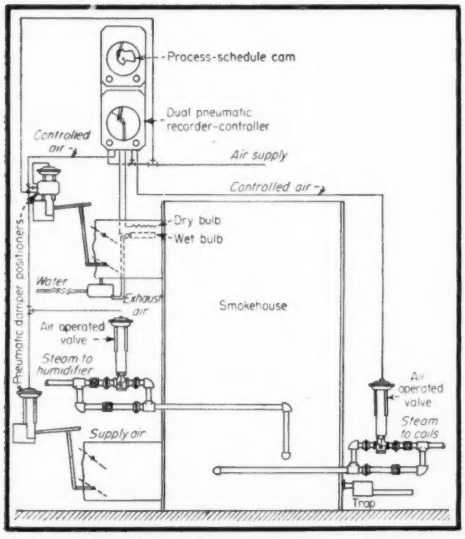
Critical applications for unit coolers already have posed instrument problems even beyond the scope of conventional wet-bulb humidity control. Since air circulation often is raised beyond 500 cfm., almost instant instrument response is desirable. Also, under such dynamic conditions direct measurement and control of actual air humidity—rather than its wet-bulb reading—would be an important simplification of the control problem.

A possible solution to many humidity-control problems of atmospheric processing is offered by the comparatively new science of electronic hygrometry. In this approach, a compact, knockwurst-size element directly senses moisture changes in the air. It utilizes proportionate changes in the electrical conductivity of lithium chloride, or similar material, in its metal conductor grid. The emf. transmitted to an associated electronic instrument varies accordingly and direct measurement and control follow.

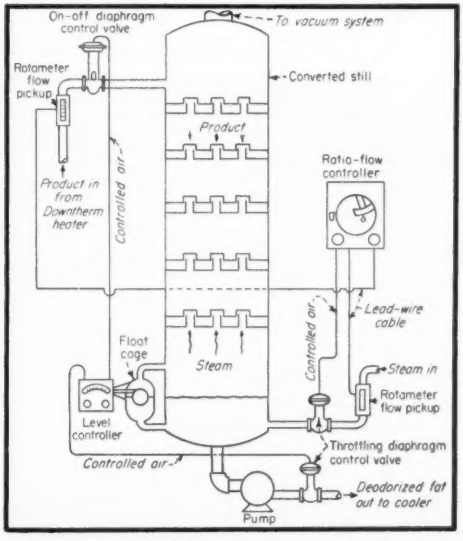
Obvious advantages of electronic hygrometry are its elimination of the wick and the interpolations necessary in wet-bulb control. But its principal advantages are unusual sensitivity and very rapid response.

In sausage drying there came one of the first demands for improved humidity control. By experimenting with unit coolers in this process, it was found that a preliminary hanging of

Smokehouse and Deodorizer Operate Automatically

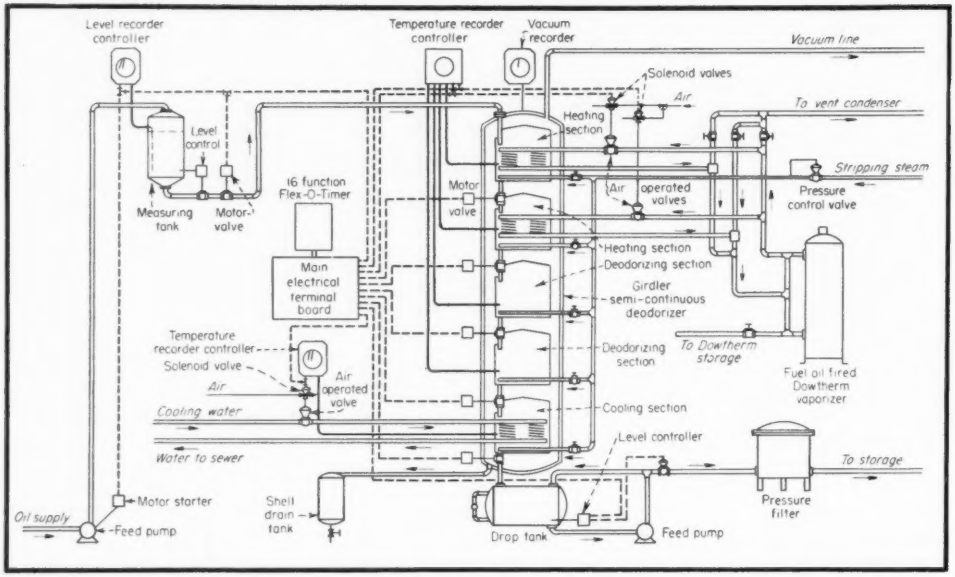


SMOKEHOUSE CONTROL system involves schedule cam, automatic dampers, and throttling valves in humidifying and heating steam lines. (Taylor Instrument drawing)



INTEGRATED CONTROL system and principle of continuous deodorizer developed by Reliable Packing. Product moves downward as steam rises.

How 175 Operations are Timed and Variables Controlled



CONTROL SYSTEM for Girdler semi-continuous deodorizer features Flex-O-Timer, which launches 175 sequenced automatic operations in 150 min. (Taylor Instrument drawing)

sausage in high-velocity air produces considerably less shrinkage in the long drying period which follows. But to be successful, the predrying air must be held exactly at the specified humidity and temperature.

Armour and Company has achieved excellent results from this process by employing direct electronic humidity control in its dry-sausage operation.

In Armour's setup, the humidity pickup is located in the duct returning air to a Niagara conditioner which serves a 20 x 75-ft sausage-hanging room. The associated electronic controller regulates a Hubbel back-pressure valve on the ammonia line which chills the water sprayed into the air. A temperature controller proportions steam to heating coils to warm the air when necessary.

Control is consistently within 1 percent humidity and 1½ deg. F.

"Inside" on Distribution

Precise atmospheric control means very little if air distribution is erratic in a processing room. This is particularly true with processes that have been speeded through use of unit coolers and high-velocity circulation. Faulty air movement which bypasses part of the goods gives unsatisfactory results.

To safeguard against improper air distribution, the conscientious packer long has employed a series of product-temperature readings taken in different locations in smokehouses and chill rooms.

In a search for greater accuracy, a stainless-steel probe-type thermocouple was devised shortly after the war. And damage from sticking thermometers into meat was eliminated by the tiny diameter and tapered point of the new device. The temperature detected by the thermocouple is indicated with fraction-of-a-degree accuracy by a portable potentiometer.

When multiple-recording came into use, it was a simple matter to pair the probe-type thermocouples with a recording instrument and obtain a vital picture of actual product temperature *during process*.

For the first time, this new multiple-location temperature-collecting system provided a true and coordinated picture of effects of air distribution on the product. And it wasn't long before the technic of in-meat measurement came to be recognized as a positive basis for process control.

Smokehouse studies were among the first to be made with the technic. Weiland Packing Co., Pheonixville, Pa., for example, found that its tendency was to oversmoke and overcook to be sure that raw center areas were eliminated. By consulting and interpreting its instrument record, it was able to cut smoking time an estimated 15 percent after correcting distribution faults in its smokehouses.

Ham Is Probed

Another ideal place for multiple in-meat temperature measurement turned up in ham boiling. Inserted directly into the boiling mold, a waterproof probe provides a continuous, graphic picture of heat penetration into the ham during process.

Schluderberg-Kurdle, Baltimore, works this ham-boiling system very effectively. By locating a probed control ham in the approximate center of each of 12 boiling vats, one operator is able to follow heat-penetration of all boiling operations on a single instrument. A marked improvement in Esskay ham uniformity and quality has resulted.

Lard Progress Spurred

Confronted by the fast-paced technology of the vegetable-oil industry, lard processors have engineered a virtual renaissance in recent years. Rendering methods and equipment have improved. Hydrogenation and deodorization have been added in quest of higher quality product. Texturizing prior to packaging has become a standard practice.

Tied in closely with lard's technological advance has been an increased need for instrument control that rivals comparative technics in other refining processes.

Take the contribution of instrumentation to the basic rendering operation itself. Much of the industry's reluctance toward universal adoption of more efficient dry rendering equipment was because the older wet process was "safer". It was much easier to turn out a light-color product that was not overcooked.

The crux of the matter was that dry rendering was difficult to control. Because the end-point of the cook came up very rapidly and at unpredictable moments, a darker, lower quality product would result. Almost constant manual sampling of crackling residue from the melter could not tie down this variable.

First efforts to lick this end-point problem involved a recording thermometer, with its bulb mounted in the vapor space above the material being rendered. This gave a good indication of progress. When the final stages of rendering appeared, a superheating of vapor coming off the product would send the instrument pen upscale to about 225 deg. F.

But this vapor-temperature correlation was not critical enough to indicate a true end-point. It could only serve as a crude warning to the operator. A better way, processors reasoned, would be to graphically follow the temperature of the product itself during rendering. Tests had proved that a true finish of the cook occured in a very critical product-temperature range.

Direct product-temperature measurement—by going through the vessel jacket with a thermometer bulb-proved to be unreliable. Despite insulation, the thermal bulb was affected by jacket temperature. And on top of this, it was almost impossible to place the bulb where it would properly contact the product without being sheared by the agitator blades.

However, the product-temperature approach has not been abandoned. The Pontiac (Mich.) Hide Co. has successfully applied a "pencil" type thermocouple through the bottom of its tallow rendering cookers. By adjusting its rendering procedure to critical temperatures charted on a recording potentiometer, this company claims to have increased yield and upgraded its product into the premium-price range.

An Electronic Approach

A few years ago, patent application was made for a system offering a totally new route to end-point determination. This involved an electronic probe which was able to pick up and distinguish subtle electrical changes which were indicative of protein-to-fat and -water relationships in the rendering material. This element, mounted through the wall of the cooker to contact the product, was hooked up to a multi-tube electronic amplifier which translated electrical signals onto a calibrated scale.

The theory behind this end-point detector is conceded to afford a direct approach to maximum yield in rendering. By offering electrical analysis of the physical relationship between fat and protein in the product, a critical value can be selected which will give maximum separation of fat from protein in subsequent pressing or chemical extraction.

In the past few years this Cook Rite instrument has been applied commercially and its use constantly improved. More than 100 units are claimed to be at work. And in all cases the tedious manual attendance normally required in dry rendering has been eliminated.

Most Cook Rite installations involve a simple light signal or buzzer action when a batch reaches its preselected end-point. But more intricate control systems have been devised to automatically reduce steam pressure as the end-point approaches and to shut down the cooker and its agitator when the cook is finished.

Actual economic advantages of this system have been highly promising. One plant obtained an average increase in fat yield of 2 percent. Add to this the increased income from a higher quality lard, plus labor saving, and gains of a few thousand dollars per year per cooker seem quite reasonable.

Charting the Cook

Working along similar lines, John Thompson, of Reliable Packing, has come up with an electronic end-point controller which now is in daily use in his Chicago plant.

What started Thompson off was a desire for a chart analysis of the product while rendering in addition to its all-important end-point determination. He reasoned that a study of the influence of various operating conditions on this curve would provide many clues to an improved process.

To rig-up such an instrument, a standard electronic strip-chart recorder —calibrated in terms of electrical conductivity—was purchased and its measuring circuit ingeniously modified for the job. A sensing element to mount at the cooker was home fabricated. Then two such systems were installed on dry rendering vessels over two years ago.

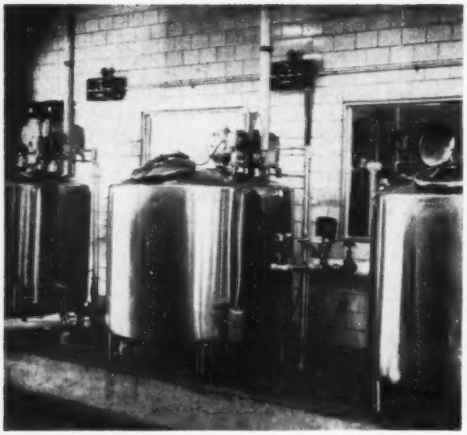
Improved rendering through graphing product development and end-point control has netted Reliable very measurable gains in quality and yield. But the most tangible benefit has been 25 percent less rendering time. This alone has saved the company the cost of an additional cooker to meet its current lard output.

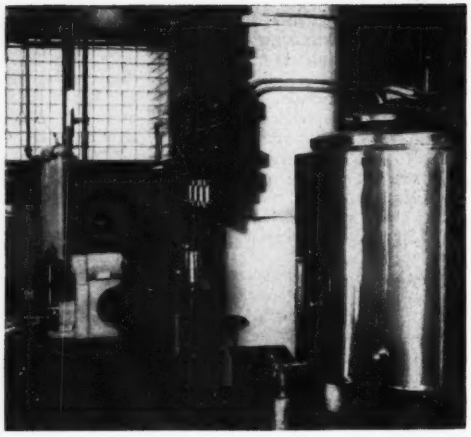
Most packers have found that advanced refining technics are needed to

(Turn to page 223)

Controlling New Extraction Process

SOLVENT EXTRACTION of fat has replaced conventional rendering at Detroit Rendering Co. New process has 15 variables which are measured, controlled. (French Oil Machinery photo)





HIGH AUTOMATION marks syrup-making operation. Left: Progress of robotized sterilizing process is pin-pointed by signal lights in panels (rear wall). Note automatic controls on 250-gal. stainless steel cookers. Right: Here in syrup room, other panels (center) show when product is cooled, also indicates status of flavored syrup in storage. Cooling in heat exchanger (left) and flavor tanks (right) is automatic, too.

Automatic Controls and Signals Feature

Pushbutton Syrup Preparation

First-floor bottling department is integrated with fourth-floor syrup-making room and second-floor storage tanks to cut product losses and reduce labor

ARTHUR V. GEMMILL
Associate Editor, "Food Engineering"

Through the application of automatic controls and special signaling devices, very important benefits can be reaped by the food processor in product formulation.

The "how" is most pointedly demonstrated by James Vernor Co., a leading Detroit bottling firm, which has made big strides in improving syrup-room operations by using such controls and devices in each step of its processing.

■ **The dividends: Assured uniformity and high quality of its ginger ale syrup —with elimination of product losses and notable reductions in labor.**

Operations are here carried out in a multi-story building, with syrup-making, syrup storage, and filling on four different floors. This would normally require a lot of leg work to assure a continued supply of syrup to the fillers, yet prevent overflowing of tanks.

But the automatic controls and indicators have completely eliminated this excess work and worry.

Two signal panels in the 1st floor filling room keep operators continually informed as to the quantity of syrup in each of the four storage tanks on the floor above. And in the 4th floor syrup room, two identical panels give similar information. In addition, liquid-level controls in the storage tanks operate automatic valves to prevent overflowing.

Pushbuttons at Work

It is in the syrup room, however, where the major quantity of automatic equipment is employed. To best illustrate its operation, let us follow the company's ginger ale syrup-making steps on the accompanying revealing diagram, which has been specifically drafted to bring out the roles of the controls and panels.

First comes opening of the electrically tripped water valve—(1) in drawing—which permits treated water to flow from the hot water storage tank into the 250-gal. cooker.

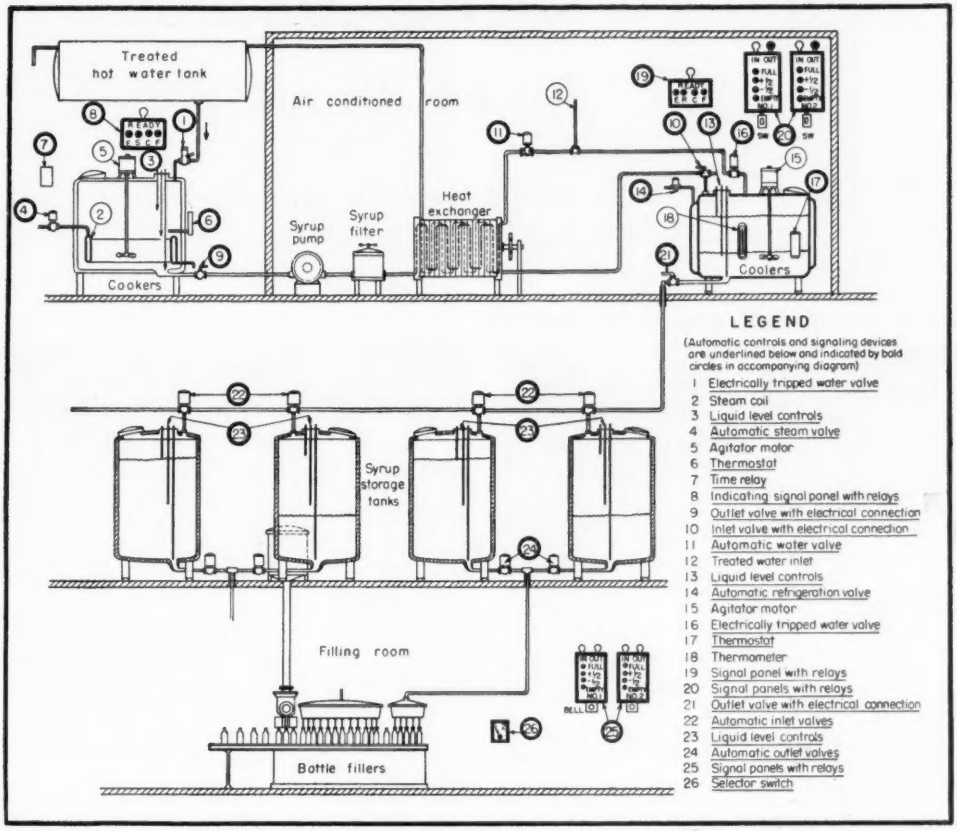
When the water level in the cooker reaches the middle measuring electrode of the liquid level control unit (3), water valve (1) is closed, steam valve (4) is opened, admitting steam to heating coil (2), and agitator motor (5) is started.

Next step is addition of the required amount of sugar for the 240-gal. batch. This raises the level to top electrode (3), which automatically turns on the "full" light in panel (8).

When temperature of syrup in the cooker reaches the boiling point, thermostat (6) trips time relay (7) and shuts off steam valve (4). At the end of the predetermined holding period, the time relay stops agitator motor (5) and turns on the red (ready) light in panel (8), indicating that the batch has been sterilized.

The operator now opens valve (9), goes into the glass-enclosed air conditioned cooler room, selects a tank that shows empty by the green light in panel (19), and opens inlet valve (10). This automatically opens valve (11)—which permits cold treated water from the line (12) to flow through the heat exchanger—and starts the syrup pump.

Advanced Units Spotlighted in Process Flow



Hot syrup is now pumped through the filter to the heat exchanger, where it gives up Btu's to the cold treated water. Upon leaving the heat exchanger, this water empties into the hot water storage tank.

When the syrup level reaches middle electrode of liquid level unit (13), automatic refrigeration valve (14) is opened, admitting refrigerant to the outside jacket of the cooler, and agitator motor (15) is started.

As soon as the cooker is empty, the syrup pump stops and water valve (11) automatically closes. The operator then opens valve (1) momentarily to flush out the cooker. This starts the syrup pump, sending the water through line, filter, and heat exchanger. When the cooker is again emptied, the syrup pump stops and the operator closes valve (9). Closing of this valve turns on the white (clear) light in panel (8).

Operator now adds required amount of flavor to the batch in the cooler and then opens electrically tripped water valve (16) to admit treated water. When level of batch reaches top electrode of unit (13), indicating that the desired volume has been attained, the water valve closes.

Cooled Syrup To Storage

As soon as the batch is cooled to the desired temperature, thermostat (17) causes refrigeration valve (14) to close and agitator motor (15) to stop and turns on the blue (ready) light in panel (19). The batch is now cooled and ready to be transferred into a storage tank.

Panel (20) indicates the amount of syrup in the storage tanks on the 2nd floor. When it shows that one of the tanks is empty, operator pushes switch at bottom of this tank panel and opens cooler outlet valve (21). Valve (22) on proper storage tank will automatically open to allow syrup to flow from cooler. Upon reaching top electrode (23), valve (22) automatically closes and stops flow of syrup.

On the tops of panels (20) and (25) are mounted two lights, one red (indicating that syrup is being run into a storage tank) and one white (indicating that syrup is being withdrawn from a storage tank).

To supply syrup to a filler, the bottling line operator selects a storage tank by means of selector switch (26). There are two of these switches (one at each filling line) to control the two storage tanks supplying the specific line.

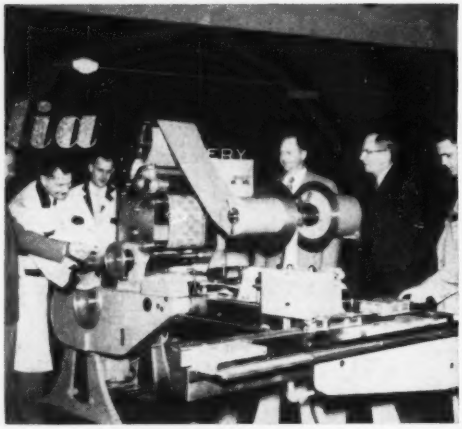
The selector switch automatically opens outlet valve (24) on the discharge line from the tank and allows the syrup to flow from storage to filler.

When this tank becomes empty, the bell—bottom of panel (25)—rings to notify the operator. He then moves selector switch (26) to another storage tank. In doing this, outlet valve (24) on the empty tank is automatically closed, the one on full tank is opened, and the bell stops ringing.

Latest Packaging Machines "Eyed" by FE Camera

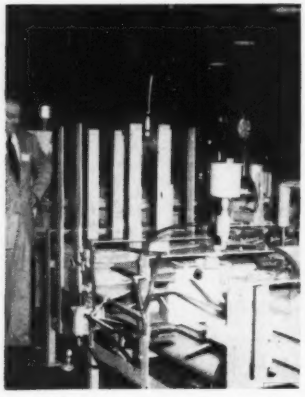
Many new developments unveiled at Atlantic City . . . Spotlighted were specially designed filling, capping, labeling, wrapping, casing units

Newest Bundlers and Case Packers

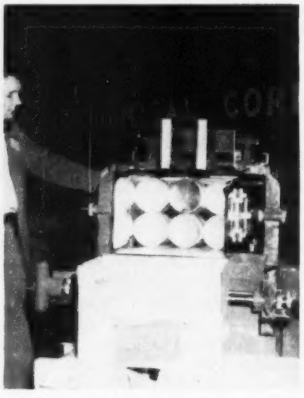


BUNDLER-PRINTER, shown by Scandia Mfg. Co., Arlington, N. J., wraps 6 or 12 packages together in kraft paper, printed on miniature press. Has double-reel stand. (84A)

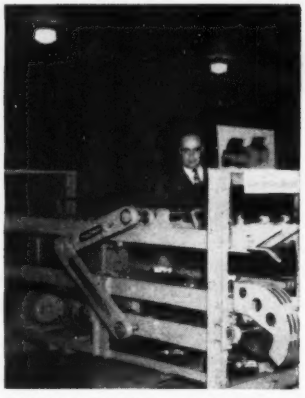
ACCUMULATOR-BUNDLER overwraps groups of packages with glue-sealing kraft paper, onto which a thermoplastic label goes. Hayssen Mfg. Co., Sheboygan, Wis. (84B)



AUTOMATIC case opener, packer, sealer (Schroeder Machines Corp., Syracuse, N. Y.) handles units at 600 /hr. Has plastic-glue applicator. (84C)



SPEEDS to 780 cases an hour are attained on non-shock caser for No. 10 cans. Unit has line divider and case-loader. FMC, Hoopeston, Ill. (84D)

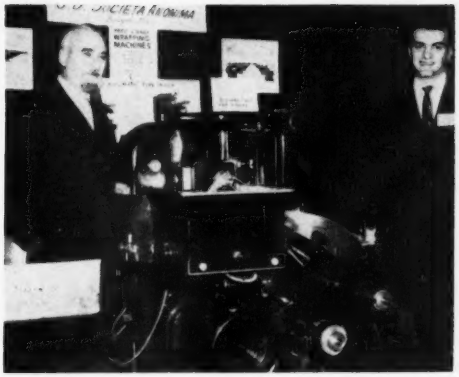


CASE SEALER has only 4-ft. compression belt. Compressible flight lugs hold case to prevent damage. ABC Packaging Mach. Corp., Quincy, Ill. (84E)

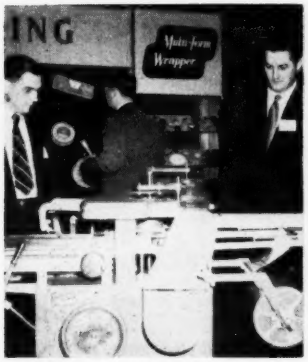
Want more information about any items in this picture article? Just circle key number (in parenthesis at end of each caption) on the Reader Service coupon adjacent to the inside back cover

Specially Designed Wrapping Machines

INSULATING corrugated sleeve, supplied by Hankins Container Corp., Cleveland, is wrapped around packaged ice cream. Speed: 60-90/min. Equipment manufacturer: Clybourne Machine Co., Chicago. (85A, 85B)

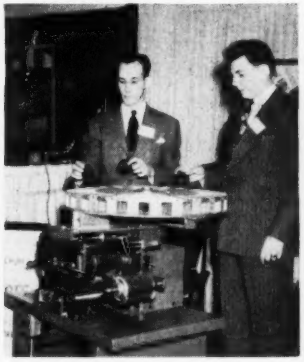


HIGH-SPEED candy-wrapping machine is equipped with automatic feed. It bow-twist or side-twist wraps a variety of candies in different films. Speeds up to 350 per min. Costruczion Meccaniche-Fonderie, Milan, Italy. (85C)

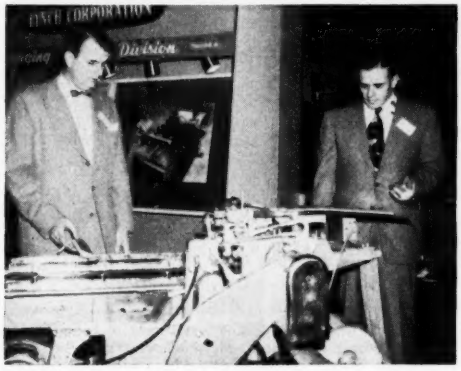


UP TO 100 multi-shaped items are wrapped per min. by this unit. Wrapping Machine Service & Tool Co., W. Springfield, Mass. (85D)

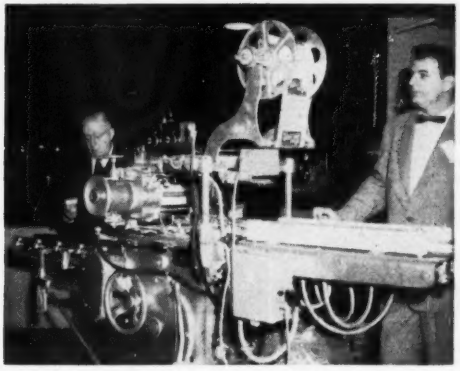
ADJUSTABLE wrapper-sealer handles square or rectangular packages 30/min. Folds, seals wrap over carton. Schooler Mfg. Co., Burbank, Calif. (85E)



THIS VERSATILE wrapper of a variety of items makes and seals packet from two rolls of heat-sealing film. Pak-Rapid, Inc., Philadelphia. (85F)

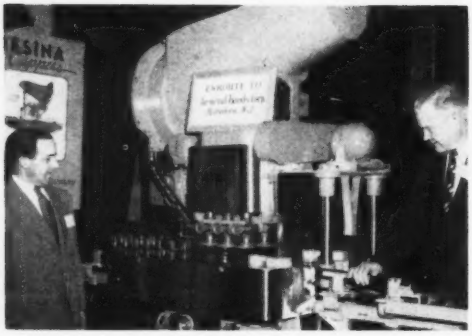


SPECIAL wrapper for ice cream sandwiches, shown by Lynch Corp., Toledo, handles 20-90 packages per minute. Electric eye spots sheet to center it over product. (85G)



SYNCHRONIZED with print-forming and wrapping machine, this equipment overwraps two ¼-lb. prints of butter or margarine in film. Lynch Corp., Toledo. (85H)

Speedy Bottle Cappers

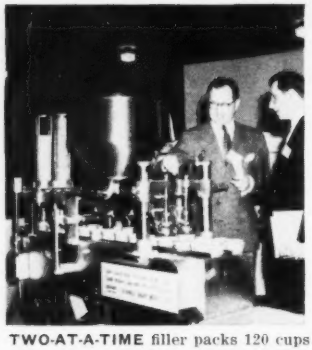


RATED for 200 per min., this capping unit's speed can be doubled in instances. Operation is termed smooth, simple, free from reciprocating levers and star wheels. Caps are seated and tightened while containers are in transit. Resina Automatic Machinery Co., Brooklyn. (86A)

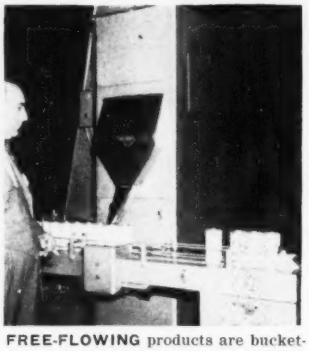
THIS UNIT spins screw caps on jars and tightens them as bottles pass through three pairs of vertical rolls. Speed of this fully automatic straight-through capper is 300/min. Manufacturer: G. D. Peters & Co., Ltd., Slough, Eng. Shown by N. J. Machine Corp., Hoboken, N. J. (86B)

Filling Machines for Wide Variety of Products

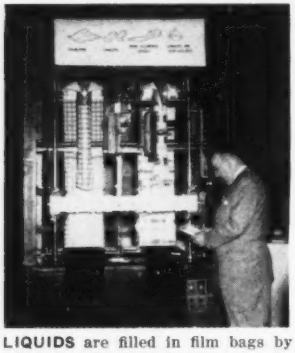
ROTARY filling unit with eight nozzles handles liquid and viscous products. Rates: Up to 200/min. Range: 5 ml.-1 qt. Maker: Karl Kiefer Machine Co., Cincinnati. (86C)



TWO-AT-A-TIME filler packs 120 cups of ice cream sundaes a minute. Unit dispenses cups, fills cream, puts on topping, applies caps. Triangle Package Machinery Co., Chicago. (86D)



FREE-FLOWING products are bucket-conveyed to vibrating hopper of this net weigher that has four compartments mounted on beam scale. Frazier & Son, Belleville, N. J. (86E)



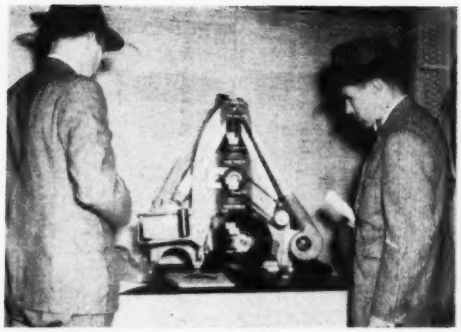
LIQUIDS are filled in film bags by this unit. Pump meters up to 1 lb. Filling is synchronized with packaging. Thermoplastic back-seam tape is featured. Transparent-Wrap Corp., Hasbrouck Hts., N. J. (86F)

HYDRAULIC weighing, at 55 units a min., and ½-16 oz. range are features of turret bag filler. Vibrating conveyors feed weigh bucket, which dumps product into filling spout. Wright Mach. Co., Durham, N. C. (86G)

NEW filler is designed to handle large volumes of free-flowing materials. Operates on continuous-rotation principle. Fills 1-25 lb. of rice or 2-8 oz. of popped corn. Spee-Dee Packaging Machinery Corp., Chicago. (86H)

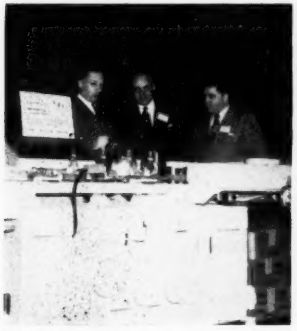
Carton Coder and Bag Printer

IMPRINTER, exhibited by Adolph Gottscho, Hillside, N. J., picks up flat, waxed, linerless cartons from magazine and deposits them on conveyor traveling to rubber die. Printed cartons are then stacked. Speed: 60 per min.(87A)



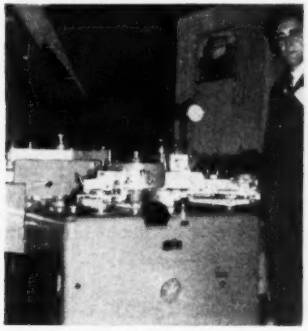
SMALL compact Rotogravure press prints three sizes of film up to 6 in. wide. Bench-type press comes with suitable ventilating unit and devices for control of infeed and rewinding tensions. Mark'Andy, Inc., St. Louis. (87B)

Labelers . . . Paster . . . and Tape Dispenser



THIS thermoplastic labeler is half size of former units offered by N. J. Machine Corp., Hoboken. Distance between heating drum and label-transfer and length of feed is cut. (87C)

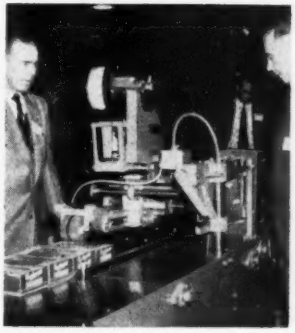
THERMOPLASTIC labeling at 300 per min. is feature of unit exhibited by MRM Co., Inc., B'klyn. Containers trip lever that actuates label pickup. Labeled jars go to wiper. (87D)



DOUBLE-MAGAZINE labeler has a straight flow, mechanical label pickup, no reciprocating parts. Speeds: 250/min. German made. Exhibitor: A. Hofmann & Co., W. New York, N. J. (87E)

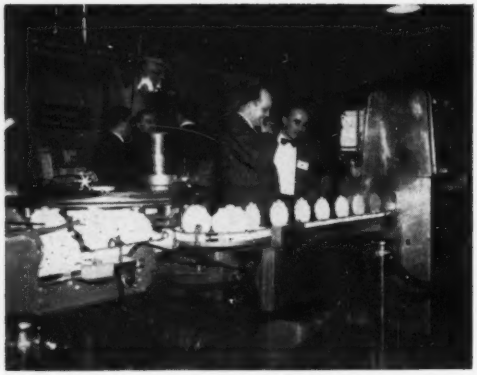
PASTER, with semi-automatic feed, is adjustable for labels ½-5½ in. wide. Fed from hopper, ungummed labels pick up adhesive and are delivered to operator's fingertips. Exhibitor: Potdevin Machine Co., Brooklyn. (87F)

JUST DIAL length on this dispenser and in split second a piece of tape is measured, cut off, cleaned, and moistened with water, ready to apply to carton without rubbing. Marsh Stencil Machine Co., Belleville, Ill. (87G)

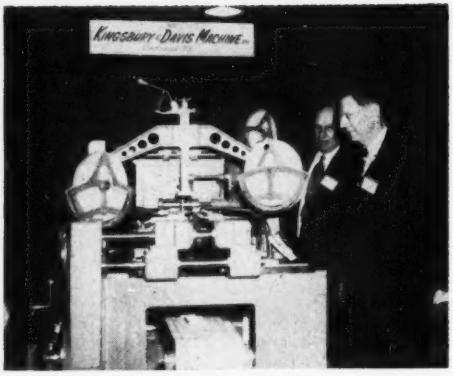


DOUBLE-DUTY unit imprints product, name, price, and ingredients on roll-fed labels and places them on packages. Speeds: 40-80 per min. Label length: 1¼-3¼ in. Oliver Machinery Co., Grand Rapids, Mich. (87H)

Latest Carton Formers and Sealing Units



COMPLETELY automatic frozen food packaging line comprises carton forming and closing machines. Exhibited by Kliklok Corp., Wilton, Conn. (FMC volumetric filler included). Speed with new carton 120/min. (88A)



NEW, automatic quadruple box-stayer turns out 150 units per min. Featured is thermoplastic stay, applied so smoothly it is invisible under wrap. Maker: Kingsbury & Davis Machine Co., Contoocook, N. H. (88B)

TWIN-HEADED Kliklok carton-former, displayed by Sutherland Paper Co., Kalamazoo, Mich., operates at 120/min. It has in-line feed for conveying canned items past forming unit. (88C)

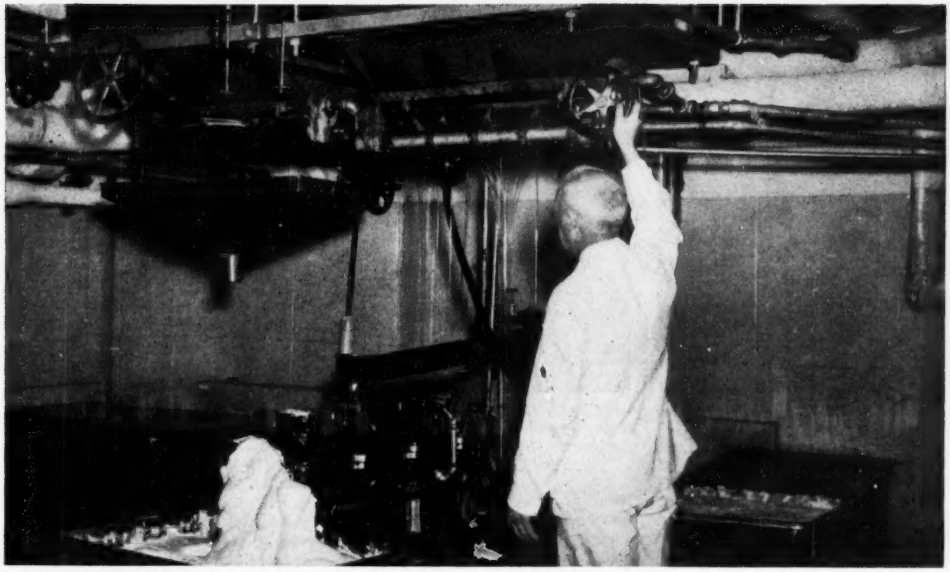
GLUE-LOCK carton former is adjustable for wide range of sizes. By gluing locks, firmer carton is produced. Speed: 40-90 per min. Package Machinery Co., Springfield, Mass. (88D)

PERFECT registration of saddle labels on bags is accomplished by new labeler that flush-seals or singly folds bag and attaches a straddle label. Woodman Co., Decatur, Ga. (88E)

ONE STROKE of arm applies gummed tape to side of carton with new applicator introduced by Mid-States Gummed Paper Co., Chicago. Tape from roll is moistened, positioned, and pressed down by device. (88F)

POSITIVE vacuum sealing on polyethylene bags is easy with Vac-Tie aluminum fastener. Single-lever action machine crimps fastener around neck of bag to make circular closure. Vac-Tie, Inc., Elizabeth, N. J. (88G)

SPECIAL foot-operated heat-sealer features electronic control of seals, visual signal for finished seal, cold heater bars, no heat-up time, and dial control of time and heat. Vertrod Corp., Brooklyn, N. Y. (88H)



COOKED SYRUP from kettle and floor-level coolers on floor above flows directly into hopper (seen top). Operator opens gate and cooled syrup falls onto narrow inclined pan feeding horizontal beater.

By Accenting Advanced Handling

Schrafft's *Does It Better*

Part II—Products

Constantly improving movement of goods, confectioner attains speedier processing cycles and greater handling flexibility on all packaging lines

JOHN V. ZIEMBA
Assistant Editor, "Food Engineering"

Mechanized, accelerated flow of products from one unit operation to another and along the packaging lines are evidenced to the *nth* degree at W. F. Schrafft & Sons Corp. confectionery plant in Boston.

Here, through adoption of advanced product-handling units and technics, this popular candy manufacturer has been assured four significant benefits—greater flexibility in product movement, higher output, lower operating costs, and better employee morale.

Every one of the many phases in this firm's candy-making and packaging operations contribute in "making the pace". We will here spotlight the following six handling innovations as especially reflecting advanced performance:

A. Gravity feeding cooked syrup directly from kettles into floor level coolers and then fondant beaters, and running "bob" (lower-boiled corn syrup) from kettles into cookers.

B. Employing automatic tray stacking and loading units for the Mogul (depositor) machines.

C. Chuting or conveying confections from Moguls, through the floors, to center-storage rooms, again through the floors, and to the enrobers.

D. Diverting flow from enrobers of any one of three major products—small peppermints, large mint patties, or assorted chocolate bars—for handling on a specific packaging line.

E. Packing cartoned goods into shipping cases mounted on specially designed roller bearing-topped tables.

F. Using two-lane lines for packaging boxes of assorted chocolates, with facilities for single or double wrapping, band-sealing, cartoning, and casing.

From *First* to *Last*

High-performance handling from first—incoming materials—to last—outgoing products—has been the criterion at Schrafft's.

This concluding feature of our two-part article considers the many advances in the product phases.

How this enterprising firm mechanized operations with incoming materials was detailed in Part I—Ingredients (page 92 Apr. FE).

Floor-to-Floor Handling of Goods

SPIRAL CHUTE delivers candies from floors above onto belt, where they are packed in trays going to storage.

INCLINED BELT carries bar goods from center storage to automatic spacers that line them up for enrober.

We will now follow materials in-process, noting, as we go along, the product-handling improvements that have brought greater flexibility and increased productivity.

Direct to Beaters

Considerable floor space and costly labor have long been saved at this plant through the adoption of a direct system of feeding cooked syrup from kettles to horizontal beaters.

Each batch is emptied from kettles—through a discharge pipe with a removable, wire-mesh strainer—into a specially designed, floor-level cooler. Here, the hot syrup is continuously cooled by horizontal, water-chilled coils enclosed in a hopper-bottom tank, with adjustable discharge.

From this tank, the cooled syrup is then fed from each hopper onto an inclined pan supplying a beater. Discharge is by means of a hand-operated wheel that opens a gasketed gate.

Inside each beater, a series of paddles, mounted on a rotating shaft, aerate the syrup to form fondant. Some of the fondant goes direct to Mogul hoppers, and the balance to the bob cream department. Fondant is collected in stainless steel, caster-mounted containers, ready to be used in the preparation of the many varieties of cream centers.

Better Handling of "Bobs"

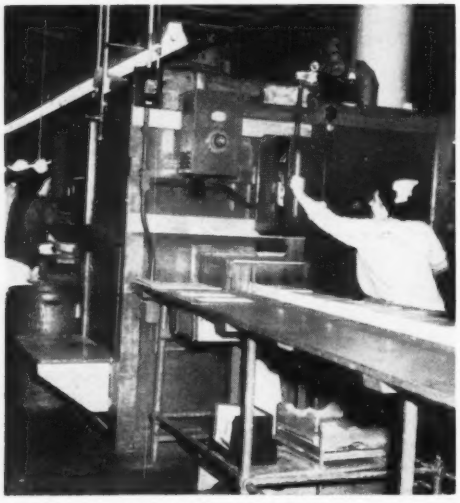
Production has also been stepped up in the preparation of creams for peppermint patties. Bob syrup, cooked in 1,000-lb. kettles on the 6th floor, is gravity-fed directly into kettles on the floor below, where it is combined with fondant.

Efficiency in the handling of trays of starch-cast creams was recently achieved through the installation of automatic stacking and loading devices on the Mogul machines. The stackers load the boards on skids, containing 30 trays each. And the loading devices automatically feed trays coming from the air-conditioned setting room onto a chain conveyor going through the Moguls.

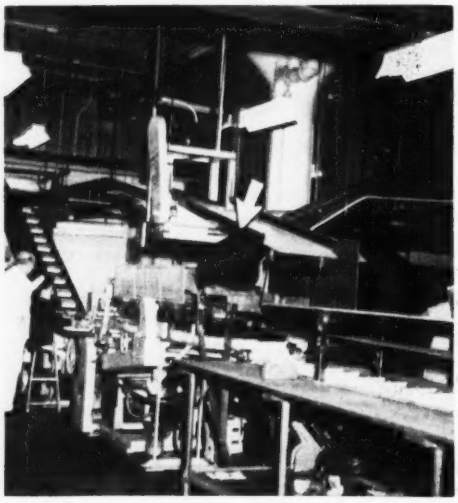
Earlier, vertical spiral chutes were installed for direct, through-the-floor delivery of starch-cast creams to the center-storage room. These narrow, stainless steel chutes were also designed to prevent damage to the candies sliding to the floors below. Other confections—hard candies, caramels, toffees, and popular bars—are also spiral-chuted to the storage room, ready to be coated with chocolate.

Still another labor-saving improvement has been the adoption of horizontal belts and additional spiral chutes or inclined canvas belts for movement of confections from center-

Packaging: Emphasis Is on Efficiency



ASSORTED CHOCOLATES are packed into fancy boxes on two-lane line, then carried through X-ray unit.



BOXES now get single or double wrapping. Feed belt (arrow) can be adjusted to supply either line.

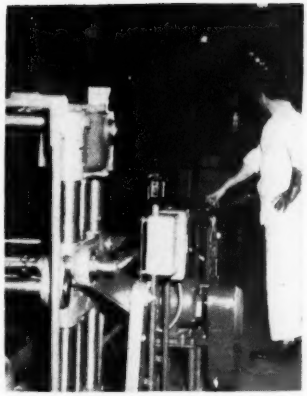
storage room to the enrobers. All but the bar goods are spiral-chuted to automatic spacers, which line them up in rows as they travel to pre-bottomers and enrobers. Bar goods are belt-conveyed to the spacing units.

Flow of confections down the chutes and inclined belts is controlled by pressing pushbuttons operating the horizontal feed belts on the floors above.

Efficient Packaging

All handling operations—feeding product, supplying packaging materials, and moving finished packages—got special up-grading for new efficiency following the war. Schrafft's engineers went about streamlining packaging lines to achieve higher performance, plus greater flexibility.

First, we will detail advanced practices in the 4th-floor bar and patty-packaging departments. Here, lines have been laid out to handle the three items—small peppermints, large patties, and assorted bars. These candies



FLOW of cases to gluer and sealer is controlled by switches actuating metal stops on three conveyor lines.

are stripped from plaques emerging from multi-tier coolers, and deposited in rows on canvas belts running the length of the enrober-packing tables.

When the production department is turning out peppermints, the candies are hand-fed to high-speed, foil-wrapping machines installed over the enrober-packing tables. Mints are next bulk-packed into 3-lb. cartons that go through X-ray machines on their way to an automatic case-gluer and sealer unit.

If, on the other hand, the run is on either the larger peppermint patties or assorted bars, then these goods are inspected as they are belt-conveyed along an enrober-packing table. Next, a 32-in. wide inclined belt raises them onto a horizontal conveyor suspended from the ceiling.

Greater Flexibility

Depending upon the confection handled, flow of goods can be diverted to either of two packaging lines. On patties, the confections make a quarter turn onto another inclined belt that conveys them to the packaging line. These rows of patties are now plowed

(*Turn to page 166*)

• • •

Two Food Empires Emerge in Canada

Weston bakeries expand to U. S., Britain. Taylor adds breweries, also is in candy, bakery, beverage, sugar milling fields. Both run supermarkets

W. G. Weston

E. P. Taylor

JAMES MONTAGNES
Canadian Correspondent, "Food Engineering"

Continued expansion of food manufacturing facilities and retail food store outlets in Canada is closely tied in with the rise and extensive growth of two large industrial food domains now active internationally.

Credited for their development are two enterprising Canadians in their early '50s—Willard Garfield Weston, operating bakeries and retail food stores in Canada and England, and bakeries in the U. S.; and Edward Plunket Taylor, heading an organization of breweries and retail food stores in Canada and the U. S.

The food field activities of these men started some three decades ago. Both began with small family firms which, through their prime skill at organization and merchandising and their accent on plant efficiency for quality, have been amplified to the present crowning proportions.

Weston launched out with one biscuit factory at Toronto. Initially, he expanded by setting up branches throughout Canada, and then he "invaded" Great Britain, where he bought up old and long-noted biscuit bakeries and retail shops. Later, he followed up by building bakeries under his name in the United States—at Passaic, N. J., Burbank, Calif., and Battle Creek, Mich.

Taylor started with one small brewery at Ottawa and spread out by buying up other breweries in Canada and the U. S. Then, after World War II, he branched his activities into candy plants, and retail stores, bakeries and retail outlets, chain groceries, chain restaurants, and industrial catering.

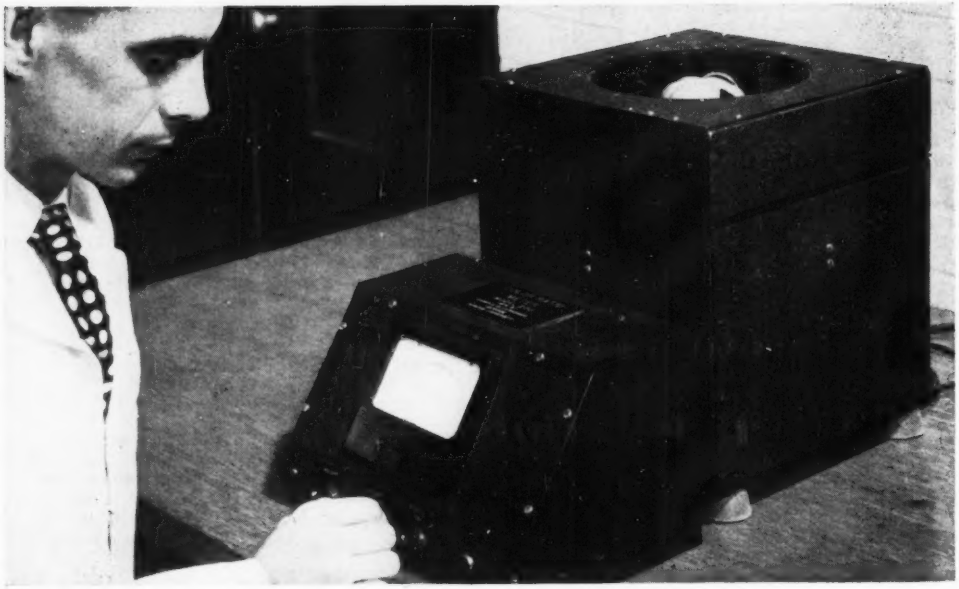
He is also in soft drinks, sugar refineries, soy bean milling, and chemical firms, as well as other enterprises not related to food products. His specialty is buying up small concerns, putting them on a paying basis, and expanding them.

In the 1951 annual report of his Canadian Food Products Ltd., which runs the candy interests, bakeries, restaurants, and industrial catering service, it was pointed out that the retail divisions were all doing well and showing a profit, but that the manufacturing divisions are not yet up to desired performance.

"Profound Effect"

There is no doubt that expansion by both men in the manufacturing spheres in the past few years has had a profound effect in the food industry.

(*Turn to page 166*)



COMPACT, portable photoelectric unit rapidly scans color of intact fruit—gives fast evaluation.

Meter Simplifies *Color Grading* Of Fruits and Vegetables

Processors' operations seen speeded, and waste reduced, by easy-to-use photoelectric instrument . . . Efficiency demonstrated in tests on tomatoes

N. W. DESROSIER, F. C. GAYLORD, W. F. KELLIE, N. K. ELLIS
Purdue Agricultural Experiment Station, Lafayette, Ind.

Recognizing that a simple, inexpensive instrument for accurate determination of the color of tomato fruit would be of decided value to canners, growers, and inspectors, we at Purdue undertook development of such a unit.

Result is our Purdue Color Ratio Meter—an easily operated unit that requires but a few seconds to make a measurement, and which gives readings that are reproducible.

■ **This instrument is applicable to color measurement problems with both raw and processed fruits, vegetables, and other products.**

Checking the Record on Color Gaging

Importance of color in determining the grade of fruit emphasizes the distinct need for accuracy in tomato color evaluations. And so, researchers explored the problem.

Younkin developed a method for measuring objectively the color of raw tomatoes, using the purees made therefrom and employing the Hunter Color and Color Difference Meter . . . Desrosier, Fawcett, and Gaylord used the Hunter Meter in color grading of canned whole tomatoes . . . Kramer and also Gould and Franz likewise used this instrument for color grading of tomato juice . . . Robinson, Ransford, and Hand described the relation of tomato juice color to raw tomato color . . . And Buck and Sparks reported similar studies, using the Hunter unit in the manufacture of catsup. In respect to the work of these researchers, the reader may consult References 4-9 (at the end of article).

It is to be noted that U. S. No. 1 tomatoes must have at least 90 percent good red color, no decay, not more than 10 percent waste, and not be soft, puffy, shriveled, extremely flat, or badly misshapen. U. S. No. 2's must have at least 66⅔ percent good red color and not more than 20 percent waste from both defects and decay. By contrast, cull fruits have less than 66⅔ percent good red color and/or more than 20 percent waste from both defects and decay.

Examination of the question evidenced the fact that cannery tomatoes are commonly contracted for and sold on the basis of raw product grades established by the U. S. Department of Agriculture. And, as shown by Gaylord,[1] purchasing of tomatoes by grade results in better returns to both canner and grower.

True, comminuted products, due to their homogeneity, lend themselves to measurement on instruments such as the Hunter Meter and the Photovolt unit. However, color evaluation with a single whole fruit—which is the method employed by Federal-State raw-product inspectors—presents quite a different problem.

It would be impossible for an inspector to cut or pulp all tomatoes. He must remember the color range and the points of deviations between the various grades. But the trained inspector, following the method described in *Shipping Point Inspection Handbook for Tomatoes for Canning and Processing*,[2] maintains the color range with a good degree of accuracy.

As for color range in the case of our new meter, we chose the scale arbitrarily—the higher the number, the poorer the color of the sample. Our meter values represent red and yellow color measurements of a band approximately 1 in. wide around the equator of the fruit. The meter separates the reflected yellow light from the reflected red.

Multiple photocell-filter combinations are spaced evenly around the fruit in (see Fig. 1.) order that a reading proportional to the average surface color may be obtained without using complex optical systems. The filters and photocells were selected so that the combined passband of filter, photocell, and light source centers at wave lengths near 6,300 angstrom units for red and 5,600 for yellow measurements.

Circular Lamp Used

In order to obtain uniform illumination on all sides of a specimen whose color distribution is to be measured, there is employed a circular fluorescent lamp, symmetrically disposed, instead of a concentrated light source and optical system. Use is made of the fact that light from a fluorescent lamp is modulated at 120 cycles per sec., to prevent a drift that would occur in a directly coupled measuring device.

In operation, the unit circuits are balanced with a spherical color standard. Red and yellow readings are adjusted to full scale. A selector switch enables standardizing at double scale for yellow and single scale for red and

(Turn to page 190)

Inside the Unit

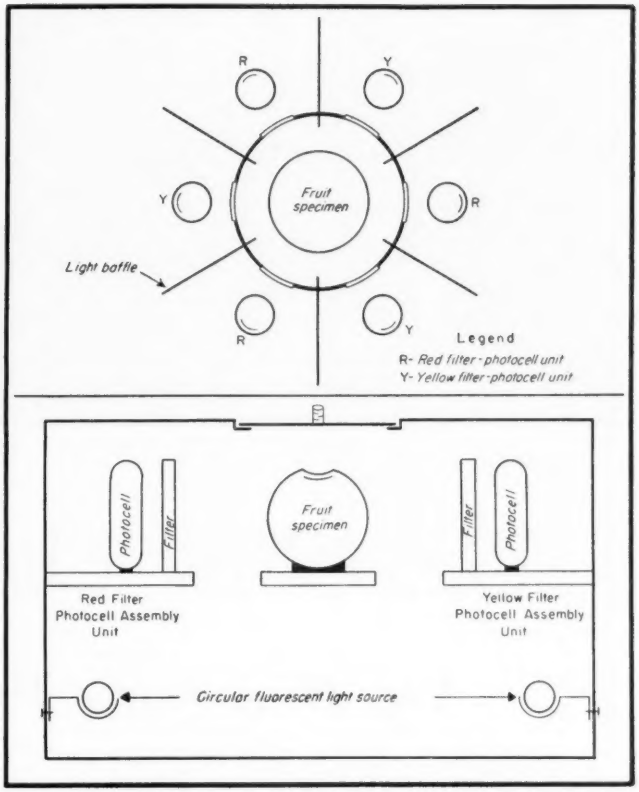


FIG. 1. ARRANGEMENT of specimen, filter, photo-cell, and light source is shown in these schematic sections (horizontal at top, vertical above).

Values Compared

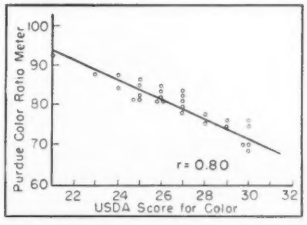


FIG. 3. USDA scores correlate with new meter's readings on juice.

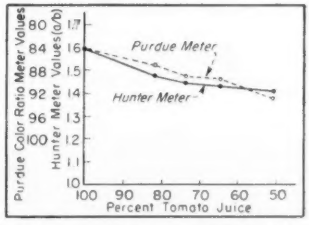


FIG. 2. PURDUE VS. HUNTER. Color ratios on tomato juice.

TABLE—RELATION BETWEEN Visual and Purdue Meter Values.

Two Federal inspectors visually graded, on different days, samples of tomatoes for color. These grade samples (low U. S. No. 1 and high U. S. No. 2) then registered the following readings when metered by the Purdue instrument.

	Purdue Color-Ratio Meter Values*			
	Low U. S. No. 1		High U. S. No. 2	
	Range	Ave.	Range	Ave.
Inspector A's fruit	62-79	71	70-80	73
Inspector B's fruit	67-84	73	70-85	75

* Color-value scale employed: Less then 73, U. S. No. 1 fruits; 73-95, No. 2; 95-plus, culls; and approaching 160, green tomatoes.

Company designed ovens . . .

MODERN WAY is exemplified in performance of these 144-ft. band ovens, which have five heat zones in which temperature is separately controlled, but recorded on single instrument. Bands are of Swedish steel.

OLD-TIME QUALITY

Via New-Time Process

Despite the passage of ten long decades, the Ry-Krisp made today is the same top-grade biscuit that won popularity at the turn of the century . . . Now, however, its qualities are "built-in" by new engineering that keeps costs "right" when all charges are higher

K. E. GARRISON
Cereal Production Manager, Ralston Purina Co., St. Louis

In the evolution of our Ry-Krisp production, two important factors have stood out—and seemingly have been opposed in tug-o'-war fashion.

On the one hand, there has been our company's uncompromising desire to maintain the same biscuit that readily won acceptance following its introduction at the start of the century. Consumer enthusiasm for the product, rather than paid promotion, has kept this food very much "on the map" for 50 years.

On the other hand, there has been the equally strong need to streamline operations in order to keep production costs in line in the face of generally rising expenses.

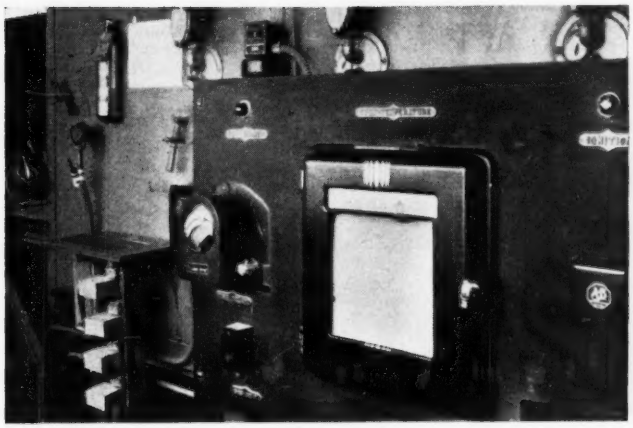
Actually, however, these two influences were not opposed. Instead, they were found to "team." For when we combined the two objectives by intensifying quality control and adding engineered mass-production technics in our processing, we were rewarded, over the years, with a continued upgrading of product uniformity.

And at the same time, this has led to a considerably reduced production cost per biscuit without a change in ingredients or loss in established taste quality.

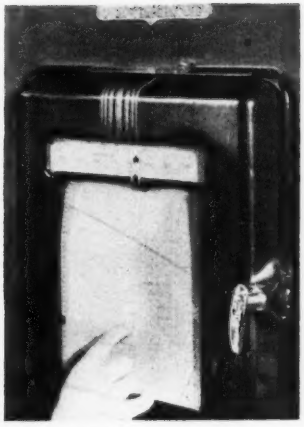
There have been three primary improvements in today's Ry-Krisp operations:

- **In-plant milling of selected and aged grain as needed for processing.**
- **Company designed continuous ovens with highly developed baking controls.**
- **Integration of laboratory activities with product control at the processing site.**

Worthy of special note, too, is the



OVEN-CONTROL panel includes multi-temperature recorder, start-up system buttons. Thermocouples (one is below extinguisher) spot zone temperatures.



CLOSEUP of recorder. It continuously notes heat at 14 locations.

introduction of incentives to employees on the basis of high caliber production and maintenance of equipment.

For a proper picture of the over-all process, let us first observe how the major ingredient—rye—is selected and handled.

All rye is purchased at the time of crope movement. A particular strain, unblended, is necessary in our formula. This grain is bought by specialists of the Checkerboard Elevator Co. (a Ralston Purina subsidiary) on the Minneapolis Grain Exchange.

When the rye is received at Minneapolis, it is cleaned and stored in company elevators nearby for at least a 4 month aging period. During this time a Zeleny temperature-scanning system protects the rye from any local overheating or spoilage.

At least three bulk railroad cars of aged rye are delivered to the Ry-Krisp plant each week. After weighing, the pit-dumped grain is elevator-conveyed to a group of steel storage bins in the mill section of the plant.

When rye is screw-conveyed from bin storage for use in the plant, it first passes through a "Haaky" cleaning separator, which scalps, aspirates out chaff, and screens out fine seeds and other material. The grain then travels through a series of Carter disk-separators, which eliminate larger seeds, foreign grain, or sticks.

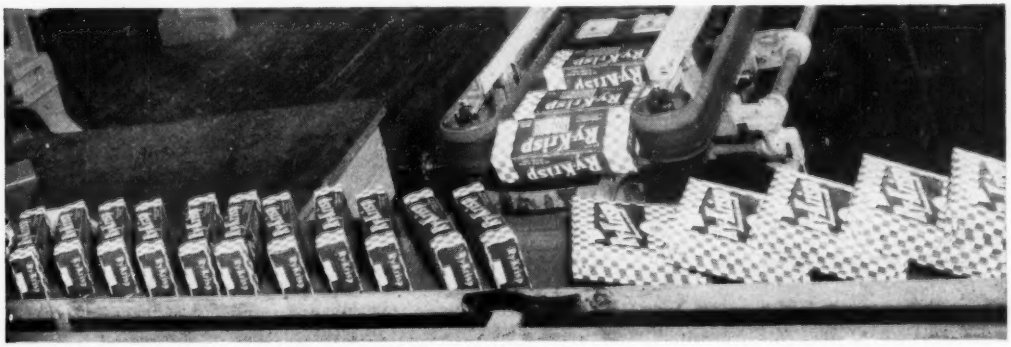
After the rye is purified, it is treated in a scouring machine, which aspirates off and removes the outside of the berry by a dry scrubbing and brushing action. A third, heavy aspiration then eliminates all lightweight berries.

Next, the rye is washed, scrubbed, and centrifugally dried in a continuous passage through a Great Western perforated reel. The object of this process is to clean the berry and remove its bitter outside coat—thus improving product flavor.

The thoroughly clean and slightly damp rye is next held for a few hours in a tempering bin to stabilize moisture content to an optimum value for the flaking operation. It is then transferred to a surge bin ahead of the cutting or "break" rolls.

All these grain cleaning activities take place on the third and second floors of the mill house, with transfer from step to step by gravity flow and conveyor. Final movement of the whole rye berry is to the first floor, where there are stationed the grinding and flaking rolls. It is to be noted here that the entire milling area is protected by a Day system of filter-tube dust collectors, plus cyclones located on the third floor.

Continuing with the processing, the whole rye berries are first cut into three or four pieces in passage through a double-stand of 10 x 30 in. Nordyke and Morman rolls—an effect very similar to the action of break rolls in a



DOUGH after 40-min. extra-cool air-whipping in Day unit. This makes for honeycomb biscuit structure.

wheat mill. To prevent damage to the rolls, a magnetic pulley is located ahead of the roll feeder to remove any metal particles.

Next, the rye particles travel through two double-stands of 10 x 30 in. Nordyke flaking rolls. After treatment by these units, the rye looks somewhat like rolled oats, but includes more floury material. The milled grain then discharges into the steel surge bins that supply the dough mixing operations.

Laboratory tests are made several times a day on incoming rye and at various stages of its milling. First, all grain is checked against its specifications—for type, grade, moisture, infestation, etc. Then the cleaned rye is evaluated and counts made for ergot, flax, and other impurities. Also made every hour is a screen test on both cracked and flaked rye. This allows the rolls to be re-set if necessary and assures correct proportions in the flour.

Closely Supervised Mixing

Much of the secret of Ry-Krisp's characteristic honeycombed texture lies in a rigidly prescribed and controlled dough mixing.

Rye flakes are exactly weighed over 50-lb. Richardson scales into one of three 500-lb. Day dough mixers. Salt and a metered quantity of refrigerated water are then added. Result after mixing is about 1,250 lb. of dough per batch.

During mixing it is important that the dough be maintained between 50-60 deg. F.—accomplished by circulating 14 deg. F. brine through the mixer jacket. About 40 min. are needed to develop a correct dough structure and to whip in enough air to increase volume by 50 to 75 percent. It is this entrapped air which accounts for the honeycombed structure of the biscuit.

Mixed dough is transferred to a trough from which it is supplied to sheet-forming rolls at the feed end of each oven. The ¼-in. sheet formed is then automatically dusted with a powder—consisting of fine rye flour and ground-up Ry-Krisp—before it passes through the sets of rolls that add separating holes and emboss the product name. Before the dough sheet reaches the oven a vacuum system sucks off the powder.

Once again, control tests give a vital check on operations in the mixing area. The temperature of the dough is noted and its weight per volume taken before any batch is released to the oven. This information permits the oven man to compensate for variations.

Prior to 1937, all Ry-Krisp was baked in small batches in a half-dozen coke-fired reel ovens. Very close manual control was necessary during the baking process to assure desired product texture. For if temperature was allowed to go too high, air would be driven from the biscuit. And if heat was inadequate the normal crisp quality would be lacking.

Engineered Baking

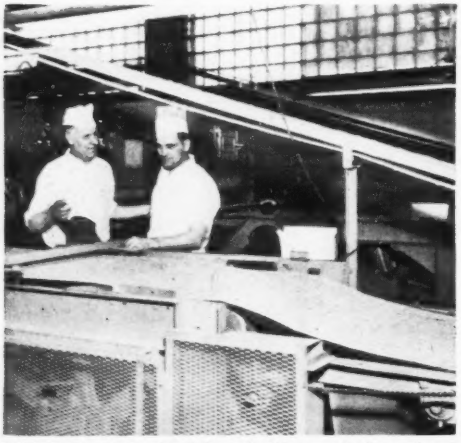
So, when the company designed a continuous band oven to mechanize its baking process, a great deal of engineering went into the heat distribution system and into methods of temperature control.

Today's three 144-ft. long continuous band ovens, which include several improvements over the original design, are considered outstanding in many ways. They employ 32-in. imported Swedish steel bands. Fuel is furnished via a Kemp system, providing safe carburation of the highly combustible air-gas mixture. There are 45 ribbon and 10 blast burners.

Each oven has five heat zones controlled by Tagliabue air-regulated diaphragm valves on the gas headers (one valve for each zone). Temperature build-up is gradual along the oven length, reaching 500 deg. F. at the dis-

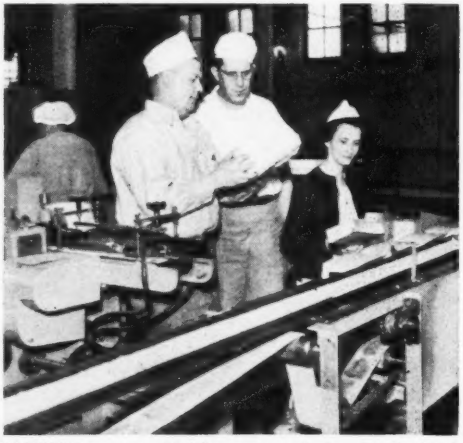
(*Turn to page 182*)

Cooled . . .



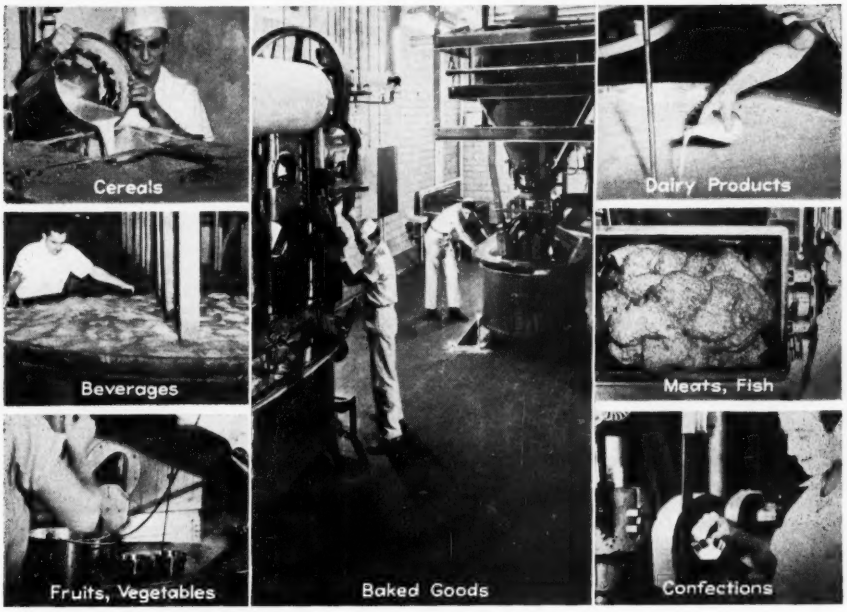
BAKED biscuit sheet is trimmed of browned edges, then is cooled (right) in air blast on wire-mesh conveyor.

. . . And Packaged



CARTONS are assembled by company designed units (left), then biscuits are hand-filled through side flaps.

A SPECIAL FOOD ENGINEERING REPORT



Major Branches of the Industry Will Find That . . .

NEWER INGREDIENTS

Aid In Production of Better Foods

Never before have food processors had at their disposal such a wide variety of special "additives" particularly developed for improving product quality.

And realizing the distinct need of food men for a handy compilation of knowledge of these new ingredients—practical, not political—FOOD ENGINEERING has here gathered in a single yet comprehensive "package" the salient working information on them.

Some of these ingredients are so new that this is virtually the first such published information relative to their properties and uses. On others, this report apprises processors of latest applications—since further uses of these agents are being discovered almost daily.

Presented first is a terse "breakdown" on optional ingredients now permitted by F&DA—written in plain-English to guide quality control men in using them.

Then covered in four individual sections are: Antioxidants, enzymes, emulsifiers, and seaweed extractives.

These newer ingredients contribute greatly to the uniformity, flavor, palatability, appearance, keeping quality, healthfulness, or "machinability" of the foods in which they are incorporated.

For example, antioxidants extend the shelf-life of fat-containing products . . . fungal enzymes give bakers better control over doughs . . . certain emulsifiers inhibit fat bloom in chocolate . . . and seaweed extractives protect frozen fish.

"Why" and "how" of each ingredient are specifically accented in this five-section report to give greatest factual "finger-tip" value for direct plant application.

In this Report—

Guide to Optional "Chemical" Additives . . . 98
Antioxidants—Provide New Flavor Controls . 102
Enzymes—Speed Natural Processes 105
Emulsifiers—Bring New Highs In Uniformity 109
Seaweed Extractives—Versatile In Foods . . . 114

MINOR INGREDIENTS to be added to a batch of cracker dough are weighed in this special preparation room at new plant of National Biscuit Co., Portland, Ore. They are then combined with major products.

Optional "Chemical" Additives

Here Are the Straight "Yes" and "No" Facts On Their Use—In Practical Quick-Check Form

TOM BELLIS
Food & Drug Officer Food & Drug Administration,
Federal Security Agency, Washington, D. C.

Extensive information pertaining to the use of "chemicals" in foods is contained in the food standards.

For each definition and standard of identity specifies the ingredients which are required to be used in the food, lists the optional ingredients, if any, that are permitted, sets limits on the quantity of these ingredients, and designates those which must be named on the label when used.

Many of the optional ingredients are familiar foods. Examples are milk, cream, butter, sugar, honey, spices, food flavorings, salt, lemon juice, celery, onions, flour, eggs, and various forms of fruit and vegetable ingredients.

Discussion of the more familiar "optionals", their labeling, and their quantitative limits is omitted in order to give major consideration here to those special agents generally regarded as "chemicals."

These ingredients will be classified according to the apparent principal functions they serve in the foods in which they are permitted.

What "Chemicals" *Where*

To give you a quick picture of what additive "chemical" ingredients may be used in what foods, the author painstakingly prepared this review of uses permitted by the food standards of the F&DA.

Put together exclusively for FOOD ENGINEERING, this review will save you a great deal of time and trouble in determining permissible uses. And while approval of an additive for one food does not necessarily mean that it can be used in a different product, such approval does indicate it is not toxic in the amounts allowed—The Editors

Dutch Process Cocoa

Alkalizing compounds are employed in the so-called Dutch processing of cacao products. Standards for these products in Part 14 of the Code of Federal Regulations (accompanying table) list the following as allowed al-

kalizing ingredients: Bicarbonate, carbonate, or hydroxide of sodium, ammonium, or potassium, and the carbonate or oxide of magnesium.

Disodium phosphate is permitted in the standard for macaroni products (16.1). Its functions is indicated by the following required label statement: "Disodium Phosphate Added for Quick Cooking." This product is also permitted in the standard for enriched farina (15.140), for shortening the time required for cooking.

Sodium citrate and sodium potassium tartrate are allowed as optional ingredients for fruit preserves and jellies (29.0; 29.5). The findings of fact discussing the use of these ingredients indicate that their function is to retard the rate of setting when the preserves or jellies are being manufactured.

The findings which support the fruit preserves and jellies standards discuss the need for additional pectin when processing fruits which are deficient in this material. The standards permit adding pectin to compensate for such deficiency.

Similarly, these standards, and also the standard for fruit butters (30.0), allow use of acidifying ingredients to compensate for any deficiency in the natural acidity of the fruits. In addition to lemon and lime juices,

READY REFERENCE TABLE to Food Standards in Title 21 of Code of Federal Regulations, With Supporting Findings of **Federal Register**

Part Numbers	Food Classes	Section Numbers*	*Federal Register* Citations to Orders Promulgating Standards
14	Cacao products	14.1 to 14.12	9, 14329, Dec. 6, 1944
15	Cereal flours and related products		
	Milled wheat products	15.00 to 15.150	6, 2574, May 27, 1941; 8, 9115, July 3, 1943; 13, 4231, July 23, 1948; 13, 6969, Nov. 27, 1948
	Milled corn products	15.500 to 15.514	12, 3107, May 13, 1947
16	Alimentary pastes		
	Macaroni products	16.1 to 16.5 and 16.9	9, 14881, Dec. 23, 1944; 11, 7504, July 6, 1946; 11, 7520, July 9, 1946
	Noodle products	16.6; 16.7; 16.10	9, 14881, Dec. 23, 1944; 11, 7504, July 6, 1946; 11, 7520, July 9, 1946
18	Milk and cream		
	Cream products	18.500 to 18.515	5, 2442, July 2, 1940
	Milk and skim milk products	18.520 to 18.540	5, 2543, July 12, 1940; 8, 14276, Oct. 21, 1943; 16, 7819, Aug. 9, 1951
19	Cheeses and related products		
	Soft uncured cheeses	19.515; 19.520; 19.525; 19.530	7, 10755, Dec. 23, 1942; 9, 3517, Oct. 27, 1944; 9, 12870, Oct. 27, 1944; 13, 5422, Sept. 17, 1948; 14, 7236, Dec. 1, 1949
	Other natural cheeses	19.500 to 19.685	6, 195, Jan. 9, 1941; 15, 5656, Aug. 24, 1950
	Comminuted cheese products	19.750 to 19.788	15, 5656, Aug. 24, 1950; 16, 1632, Feb. 16, 1951
25	Dressings for foods	25.1; 25.2; 25.3	15, 5227, Aug. 12, 1950
27	Canned fruits		
	Fruits	27.0 to 27.33	4, 4920, Dec. 22, 1939; 5, 93, Jan. 9, 1940; 5, 2399, June 28, 1940; 7, 1612, Mar. 3, 1942; 12, 6907, Oct. 23, 1947
	Fruit cocktail	27.40; 27.41; 27.42	7, 5542, July 21, 1942; 7, 6458, Aug. 28, 1942; 7, 10517, Dec. 16, 1942
29	Fruit preserves and jellies**	29.0**; 29.5**	5, 3554, Sept. 5, 1940; 17, 2596, Mar. 26, 1952
30	Fruit butters**	30.0**	5, 3561, Sept. 5, 1940; 17, 2596, Mar. 26, 1952
36	Shellfish		
	Canned shrimp	36.3	7, 4944, July 2, 1942; 13, 3375, June 23, 1948
	Canned oysters	36.5; 36.6	9, 14008, Nov. 25, 1944; 13, 1337, Mar. 13, 1948; 13, 4663, Aug. 12, 1948; 14, 7249, Dec. 2, 1949
	Raw oysters	36.10 to 36.22	11, 9331, Aug. 27, 1946
42	Eggs and egg products	42.10 to 42.60	4, 3374, July 20, 1939
45	Oleomargarine	45.0	6, 2761, June 7, 1941
51	Canned vegetables (specific standards)		
	Peas	51.0; 51.1; 51.2	5, 739, Feb. 24, 1940; 7, 9919, Dec. 1, 1942; 12, 950, Feb. 11, 1947
	Snap beans	51.10; 51.11; 51.15; 51.16	12, 1137, Feb. 19, 1947; 13, 3724, July 3, 1948
	Corn	51.20; 51.21; 51.22; 51.30; 51.32	16, 7644, Aug. 4, 1951
52	Canned vegetables other than those specifically regulated	52.990	5, 806, Feb. 28, 1940; 5, 2399, June 28, 1940; 10, 6055, May 26, 1945; 12, 1137, Feb. 19, 1947; 14, 2411, May 10, 1949; 16, 7644, Aug. 4, 1951
53	Tomato products		
	Tomato juice; catsup	53.0; 53.5; 53.10	4, 3453, July 29, 1939; 6, 208, Jan. 9, 1941
	Tomato puree; tomato paste	53.20; 53.30	4, 3325, July 18, 1939
	Canned tomatoes	53.40; 53.41; 53.42	4, 3321, July 18, 1939; 5, 2282, Sept. 17, 1940; 12, 3887, June 14, 1947; 16, 12763, Dec. 20, 1951

* In some Parts, Section Numbers are not consecutive since there are skips in the sequence.

** Fruit jellies renumbered to become Sec. 29.2; fruit preserves to become Sec. 29.3; and fruit butters to become Sec. 29.1 of Part 29 (17, 2596, Mar. 26, 1952)

vinegar and citric, lactic, malic, or tartaric acids are allowed.

In contrast to the recognition of optional acidifying ingredients to compensate for deficiency of natural acid in the fruits used to make preserves, jellies, and fruit butters, the standard for tomato paste (53.30) permits the optional use of baking soda to neutralize part of the acids during the processing.

The standard for evaporated milk (18.520) provides that calcium chloride, disodium phosphate, or sodium citrate may be used to aid in the processing.

The findings in support of the cheese standards in Part 19 recognize that, at times, milk used in manufacturing cheese may be deficient in its calcium content. To compensate for this deficiency the standards allow optional use of purified calcium chloride.

Some Are Added for Taste

Most of the optional ingredients in standardized foods which have as their function modification of taste, fall in the category of familiar products. However, some of them would not be so classed. Standards for mayonnaise and other dressings for foods in Part 25 list monosodium glutamate as an optional ingredient for taste effect.

A number of the standards for cacao products under Part 14 list vanillin, ethyl vanillin, and coumerin as specifically designated artificial food flavorings which are permitted. The optional artificial flavor specified for oleomargarine (45.0) is diacetyl, which may be added as such or as starter distillate, or which may be produced through the addition of citric acid or harmless citrates.

The standard for Provoloni cheese (19.590) provides that it may be smoked. The standard for pasteurized process cheese (19.750) recognizes that cheeses which have been smoked may be used in its manufacture. This standard also provides that the pasteurized process cheese itself may be smoked or there may be added to it substances prepared by condensing or precipitating wood smoke.

Analogous provisions are repeated for some of the other comminuted cheese products in this Part.

Others to Increase Acidity

The use of optional acidifying ingredients to compensate for acid deficiency of fruits in the manufacture of preserves, jellies, and fruit butters has been mentioned previously. Vinegar and citric acid are recognized optional acidifying ingredients in the standard for canned vegetables other than those specifically regulated (52,990).

The standards for mayonnaise and other dressings for foods in Part 25 require that an acidifying ingredient be used. However, they permit the optional use of vinegar, lemon, or lime juice and also allow limited use of citric acid with vinegar.

A number of acidifying ingredients are optionally allowed in some of the standards for comminuted cheese products in Part 19. Here, the limit on the quantity of acidifying ingredients is set by specifying a minimum pH value for the finished products. The acidifying ingredients listed are vinegar, lactic, citric, acetic, and phosphoric acids.

Some Added for Appearance

Aside from natural and artificial food colorings, there are several optional ingredients permitted in standardized foods to effect the color. Standards for flour and for a number of other milled wheat products in Part 15 allow use of specified bleaching agents. Optional bleaching agents permitted are oxides of nitrogen; chlorine; nitrosyl chloride; chlorine dioxide; and 1 part by weight of benzoyl peroxide mixed with not more than 6 parts by weight of one, or any mixture of two or more of the following: Potassium alum, calcium sulfate, magnesium carbonate, sodium aluminum sulfate, dicalcium phosphate, tricalcium phosphate, starch, calcium carbonate.

A bleaching agent is permitted in the standard for Gorgonzola cheese (19.567). This provides that the milk may be bleached by the use of benzoyl peroxide or a mixture of benzoyl peroxide with potassium alum, calcium sulfate, and magnesium carbonate. The standard sets limits on the quantity of benzoyl peroxide and carrier permitted. It also requires that, when the milk is bleached, vitamin A must be added to the curd to compensate for the destruction of this vitamin resulting from the bleaching.

Magnesium compounds and alkalizing agents are optional ingredients permitted in the standard for canned peas (51.0) to protect the chlorophyll in them from destruction during processing. This results in the canned peas retaining more of their green color. Ingredients listed for this purpose are hydroxide, oxide, or carbonate of magnesium; hydroxide, carbonate, or bicarbonate of sodium; and calcium hydroxide.

Some Produce Firmness

The identity standards for canned potatoes in the general vegetable standard (52.990), and for canned tomatoes (53.40), were amended to allow the optional use of calcium salts as firming ingredients. The salts recognized for such use are calcium chloride, sulfate, citrate, and monocalcium phosphate.

Vegetable gums, and other substances with similar functional properties, are recognized optional ingredients in Part 19 for cream and Neufchatel cheeses, pasteurized process cheese food, and some other cheese products, and in Part 25 for French and salad dressing. The standards for cream and Neufchatel cheeses list gum karava, gum tragacanth, carob bean gum, gelatin, and algin. All of these are also listed in the standard for pasteurized process cheese spread in addition to the following: Guar gum, carboxymethylcellulose, carrageen, oatgum, and propylene glycol ester of alginic acid.

Algin and the vegetable gums, which are listed in the cream cheese standard, are also given in the standards for French and salad dressing. In addition to these, standards for dressings list gum acacia, guar gum, sodium carboxymethylcellulose, extract of Irish moss, pectin, and propylene glycol ester of alginic acid.

The emulsifying agents optional in the standard for oleomargarine (45.0) are lecithin, mono- and diglycerides of fat-forming fatty acids, and sodium sulpho-acetate derivatives of such mono- and diglycerides. Specified combinations of these emulsifying agents are permitted by F&DA.

In the standards for chocolate coatings in Part 14, the optional emulsifying agents listed are: Lecithin, with or without related natural phosphatides, and mono- and diglycerides of fat-forming fatty acids in combination with monosodium phosphate derivatives of these glycerides.

Optional emulsifying salts are recognized by the standards for pasteurized process cheese (19.750) and a number of other comminuted cheese products. Mono-

How Standards Are Adopted

By Section 401 of the Federal Food, Drug, & Cosmetic Act the Federal Security Administrator is granted general authorization, subject to certain specified exceptions, to promulgate regulations establishing reasonable standards for foods. His yardstick for exercising this authority is the promotion of honesty and fair dealing in the interest of consumers.

The legislative requirements as to the procedure to be followed in establishing regulations are set out in Chapter VII of the Act and in the Administrative Procedure Act.

In brief, these are the procedural steps followed in adopting food standards:

A notice announcing the public hearing and reciting proposed regulations in general terms is published in the *Federal Register* not less than 30 days prior to the time set for the hearing to open. At the hearing, all interested persons having evidence relevant to the standards under consideration are given an opportunity to offer oral testimony and exhibits. Witnesses are subject to cross-examination. Testimony is recorded.

After all the evidence has been received, the presiding officer closes the hearing and gives the parties an opportunity to submit recommended findings of fact and suggested regulations.

After the record has been studied and the recommended findings and suggested regulations have been considered, the Administrator publishes, in the *Federal Register*, a tentative order setting forth the findings, the conclusions drawn, and the food standard regulations which he proposes to adopt. Parties who take exception to the tentative order are given a period of time in which to file their exceptions and supporting briefs. These are considered. And then a final order promulgating the regulations is published in the *Register*.

All food standards are available in files of the *Register*. However, the set of books constituting the Code of Federal Regulations is a more convenient reference. Food standards are compiled under Title 21 of this Code, and Title 21 is separately available in a single volume, with an annual cumulative pocket supplement which brings it up to the current year.

It is necessary to refer to the *Federal Register* only for regulations issued during the current year.

However, anyone interested in the detailed findings of fact in support of regulations will have occasion to consult files of the *Register* because the Code does not compile findings.

Our table (bottom p. 99) has been prepared to facilitate reference to food standards in the Code of Federal Regulations and to the supporting findings in the *Register*. This table shows the part numbers, it classifies the foods for which standards have been established, and it indicates the section numbers which are used to designate the specific food standards in Title 21 of the Code. Here, 171 section numbers correspond to definitions and standards of identity, 10 to standards of quality, and 11 to standards of fill of container.

The table shows the *Register* citations by volume, page, and date for all food standard final orders up to this date.

Final orders to adopt standards for bread and related bakery products and for frozen fruits and to amend standards for canned mushrooms and for oleomargarine are pending.

sodium, disodium, and trisodium phosphate, dipotassium phosphate, sodium metaphosphate, tetrasodium and sodium acid pyrophosphate, sodium, potassium, and calcium citrate, sodium tartrate and sodium potassium tartrate are the emulsifying agents named in these standards.

Chemical Preservatives

Sodium benzoate and benzoic acid are optional chemical preservatives permitted by the standards for fruit preserves and jellies (29.0; 29.5) and oleomargarine (45.0).

A hearing was conducted pursuant to application by interested manufacturers on their proposal to make sodium benzoate a permitted optional ingredient for use in catsup. The proposal was denied on the grounds that the use of this chemical would foster production of catsup of less than the usual concentration and acidity and would not promote honesty and fair dealing in the interest of consumers.

The standard for pasteurized process cheese spread (19.775) furnishes an interesting example of optional acidifying ingredients being designated as chemical preservatives when used in such concentration as to achieve a preserving effect.

Section 403(k) of the Act deems a food misbranded if it contains any chemical preservative unless it bears labeling stating that fact.

The pasteurized process cheese spread standard permits vinegar, lactic, citric, acetic, or phosphoric acid to be used in such quantity that the pH does not fall below 4.0. However, the standard provides that when acidifying agents are used so that the pH is below 5.0, the label must show that the acidifying ingredient is a "Chemical Preservative."

Standards for enriched flours, farina, cornmeals, corn grits, macaroni products and noodle products in Parts 15 and 16 require the addition of specified vitamins and minerals. They also designate optional ingredients that may be added to increase the vitamin and mineral value of these foods. These are vitamin D and calcium in a form that is harmless and assimilable.

The standard for evaported milk (18.520) provides that vitamin D may be added as an optional ingredient. Vitamin A is an optional ingredient recognized by the standard for oleomargarine (45.0).

Meat-Product Application

In addition to the F&DA food standard regulations, processors may refer to Section 18.7 of Title 9 of the Code of Federal Regulations.

This section of the Bureau of Animal Industry regulations is captioned in part, "Use in preparation of meat food products of chemicals, preservatives, coloring matter . . ." The first paragraph of this section prohibits substances that impair wholesomeness or which are not approved by the Chief of the Division.

Some of the ingredients permitted in rendered animal fats or combinations of such fats with vegetable fat, subject to specified limits as to quantity and to appropriate label declaration, are monoglycerides and diglycerides, resin guaiac, nordihydroguaiaretic acid, tocopherols, citric acid, and propyl gallate.

For most of these ingredients, the quantitative limit is only a fraction of 1 percent. The regulations allow several specified processing chemicals, subject to their being completely eliminated during the process of manufacture or washed away with clear water following the treatment in which they are used.

ANTIOXIDANTS . . .

Provide New Flavor Controls

ARTHUR V. GEMMILL
Associate Editor "Food Engineering"

Prevention of oxidative rancidity is of great economic importance, not only in foods consisting primarily of fats, but also in products which contain appreciable amounts of them.

True, the food processor can, by special care in his processing, work to retard its development. But for its prevention, the prescription calls for antioxidants—practical use of which will be spotlighted here.

The rancidity in question is characterized in the early stages by a sweet but undesirable flavor and odor that becomes more pungent and penerating as deterioration progresses.

In addition to these undesirable organoleptic characteristics, some of the products that develop during this rancidification are toxic to animals.

Ways To Control It

Development of oxidative rancidity may, of course, be delayed, and in some cases even prevented by proper choice of raw materials; elimination or reduction of exposure to air, light, or excessive temperatures during processing; prevention of contamination with metals such as iron or copper; hydrogenation; and assurance of proper packaging.

But—even greater stability than can be obtained by these measures is often desirable or even necessary.

And in such cases, use of the proper antioxidant goes a long way toward solving the problem.

Evaluating Antioxidants

Enormous variations are found in the effectiveness of different antioxidants in a particular fat or combination of fats. For example, tocopherols are effective in stabilizing animal fats but not vegetable fats. And certain acids extend the life of vegetable oils but are ineffective with animal fats.

Another consideration in evaluating an antioxidant is the conditions to which it may be subjected. When fats are used in the manufacture of products that must be stored, the ability of an antioxidant to maintain its effectiveness is very important.

Toxicity of the antioxidant is important, too. According to provisions of the Food, Drug & Cosmetic Act, any antioxidant incorporated in a food must be declared on the label. Further, it must be either non-toxic or, if it is toxic, its level of safety must have been established and tolerance limits set by open hearings of the Federal Security Commission.

This has the effect of preventing use of an antioxidant unless it has been declared safe by the F&DA, or unless its use has been approved in certain products by some other federal agency.

The Meat Inspection Division of the Bureau of Animal Industry, USDA, has approved several antioxidants for use in rendered animal fats, or mixtures of these fats and vegetable fats, prepared in establishments operated under federal meat inspection.

Among other important characteristics of an antioxidant are the color, flavor, and odor imparted to the food in which it is incorporated.

Solubility is still another extremely important factor. Highly soluble antioxidants may be added directly to the fat during any of the several processing steps. Less soluble products must be incorporated by means of a solvent which is miscible or easily dispersed in the fat before deodorizing or drying. The solvent may then be removed during subsequent processing steps.

Finally, cost and availability must be considered.

Federally Approved Materials

The first product to be approved as an antioxidant for use in lard by the BAI was gum guaiac. Later, lecithin, nordihydroguaiaretic acid (NDGA), tocopherols, propyl gallate, thiodipropionic acid and its higher esters, butylated hydroxyanisole (BHA), and citric and phosphoric acids were approved.

Gum guaiac, a secretion of the tropical tree *Guaiacum officinalis*, which grows in the West Indies, has been approved for use in lard in concentrations up to 0.1 percent.

It is largely phenolic in nature but less effective than most products of this type. Carry-over in baked goods is fair.

Gum guaiac is difficult to incorporate in fats, and although it was largely used as a stabilizer for animal fats at one time it is now practically outmoded among antioxidants.

Lecithin was among the first products to be given serious consideration as an antioxidant. Although it is somewhat effective in vegetable oils, it has very little effect upon lard.

Lecithin is commercially available in large quantities at low cost, and is easily added to lard by first dissolving it in 5-10 times its volume of the lard at 130 deg. F., filtering, and then adding to the bulk tank. It is approved for use in unlimited quantities.

Nordihydroguaiaretic acid (NDGA) is extracted from an American desert plant *Larrea divoricata*. It has been approved for addition to fats in amounts up to 0.01 percent.

NDGA is an extremely effective antioxidant for animal fats and has a fair carry-over into baked products. It is less effective in vegetable oils.

The product is physiologically harmless in the low concentrations used for stabilizing fats. And it imparts no unfavorable color, odor, or flavor to lard.

Although only slightly soluble in fats, NDGA may be incorporated in fats by means of a solvent such as alcohol or acetic acid. Or it may be added directly to hot (240 deg. F.) lard.

Tocopherols are present in vegetable oils in nearly optimum amounts, which probably accounts for the stability of these oils.

In animal fats, tocopherols are found in such small

quantities that a considerable stabilization can be obtained by their addition.

Even before the use of tocopherols was federally approved (up to 0.03 percent may be added to rendered animal fats), they were incorporated in lard by adding 3-10 percent edible vegetable oils. At the present time they are added in the form of a 30 percent concentrate in vegetable oils.

Propyl gallate is an effective phenolic antioxidant federally approved for use in edible fats in quantities up to 0.01 percent.

It is incorporated directly in fats by stirring and heating to 160-175 deg. F., or the desired amount may be dissolved in a small portion of the fat, which is then easily mixed with the remainder of the batch.

Propyl gallate is non-toxic in the amount approved for use, and it does not adversely affect the color, odor, or flavor of the fat to which it is added. Its effectiveness is not carried over into baked goods.

Addition of a small amount of citric, tartaric, or phosphoric acid to propyl gallate enhances the effectiveness of this antioxidant. One such combination—0.01 percent propyl gallate and 0.005 percent citric acid—is approved by the BAI for use in animal fats.

In 1948 the American Meat Institute Foundation announced development of a new antioxidant containing butylated hydroxyanisole (BHA) that will not only stabilize fat, but will also carry through in baked goods made with the fat.

BHA is readily soluble in fats and oils and imparts good shelf life to lard. When combined with synergists (such as citric or phosphoric acid) and propyl gallate or hydroquinone, it imparts high stability, greatly improved shelf life, and is very effective in protecting foods such as crackers and pastry made with the lard. BHA is approved for use in quantities up to 0.02 percent alone, and in conjunction with propyl gallate and citric acid.

At present, several manufacturers are marketing special combinations of BHA, citric acid, and propyl gallate dissolved in a solvent such as propylene glycol or lethicincitrate.

Citric acid is an antioxidant of the synergistic type that has been approved by the BAI for use in quantities up to 0.01 percent. Its effectiveness is greatest in vegetable fats.

Due to its insolubility, citric acid must be introduced into a fat by means of a solvent, or by grinding it into a colloidal suspension in fat.

In combination with NDGA—0.005 percent citric and 0.01 percent NDGA—it is very effective in stabilizing both vegetable and animal fats. This combination has been federally approved.

Phosphoric acid is another synergistic antioxidant that is relatively ineffective when used alone. It is very insoluble and must be carefully dispersed in the fat.

It has been used in combination with tocopherols, and with NDGA. With the latter its effectiveness in lard is slightly greater than that of the NDGA-citric acid combination.

A number of additional products have received considerable attention due to their antioxidant properties, but none has been specifically approved by any federal agency for addition to foods.

Stability of Lard

As can be seen in Table I, the previously discussed antioxidants are all effective in preventing oxidative rancidity in lard.

However, certain of the products are much more effective than others. This factor has reduced the number of antioxidants now in use. For example, gum guaiac and thiodipropionic acid are no longer used, tocopherols are used very little, and lecithin is used primarily as an emulsifier.

If the lard is to be used in bakery products or for deep frying, the antioxidant selected should have good carry-over. Here, the combination of BHA, propyl gallate, and citric acid is extremely effective (see Table II).

When used in shortenings for prepared mixes, the flavor, color, and odor imparting characteristics of the antioxidant should be considered. Propyl gallate, an extremely powerful antioxidant, turns green in the presence of egg yolk, and black when iron is present. NDGA also undergoes a color change when in a fat incorporated in pre-mixes.

Carry-through is relatively unimportant in a shortening for prepared mixes. Reasons: Storage of the baked

Figures Give the Proof

TABLE I—STABILITY of Steam-Rendered Lard Is Improved by Adding Antioxidants*

Antioxidant	Amount Used Percent	Stability (AOM) Hr.		Protection Factor
		Unprotected	Protected	
Gum guaiac	0.01	4.1	3.4	....
Gum guaiac	0.05	4.1	9.0	2.2
Gum guaiac	0.10	4.1	12.3	3.0
Lecithin	0.01	4.1	4.8	1.2
Lecithin	0.05	4.1	5.9	1.4
Lecithin	0.10	4.1	7.0	1.7
NDGA**	0.01	4.1	50.0	12.2
NDGA	0.05	4.1	42.0	10.2
NDGA	0.10	4.1	35.0	8.5
a-Tocopherol	0.01	4.1	17.0	4.1
a-Tocopherol	0.05	4.1	11.3	2.8
a-Tocopherol	0.10	4.1	5.4	1.3
Propyl gallate	0.01	4.1	43.8	10.6
Propyl gallate	0.05	4.1	90.0	21.9
Propyl gallate	0.10	4.1	88.0	21.5
BHA***	0.01	4.1	19.0	4.6
BHA	0.05	4.1	20.4	5.0
BHA	0.10	4.1	21.4	5.2
NDGA Citric acid	0.005 0.01	6.0	62.0	10.3
BHA Propyl gallate Citric acid	0.01 0.003 0.002	4.0	60.0	15.0
Propyl gallate Lecithin	0.0075 0.0075	10	58	5.8
Corn oil Citric acid	0.027 0.002			
BHA H_3PO_4	0.01 0.005	7	53	7.6
BHA Citric acid	0.01 0.005	8	39	4.9
Thiodipropionic acid	0.01	7	50	7.1
Thiodipropionic acid BHA	0.01 0.01	7	145	20.8

* Figures on gum guaiac, lecithin, NDGA, tocopherol, propyl gallate, and BHA, from Moore, R. N., and Bickford, W. G., *The Journal of the American Oil Chemists' Society*, Jan. 1952. Figures on combination of NDGA and citric acid, from Riemenschneider, R. W., *Trans. Amer. Assn. Cereal Chemists*, Apr. 1947. Figures on thiodipropionic acid and the following combinations: BHA, propyl gallate, and citric acid; propyl gallate, lecithin, corn oil, and citric acid; BHA and H_3PO_4; BHA and citric acid; and thiodipropionic acid and BHA, from Kraybill, H. R., Dugan, L. R., Jr., Beadle, B. W., Vibrans, F. C., Swartz, V., and Rezabek, H., *The Journal of the American Oil Chemists' Society*, Sept. 1949.

** Nordihydroguaiaretic acid.

*** Butylated hydroxyanisole.

products is short, and ingredients of cake mixes contain many natural antioxidants.

Vegetable Oils

Natural antioxidants such as tocopherols are present in vegetable oils to such an extent that these oils are not particularly subject to oxidative rancidity. This is especially true of cottonseed and peanut oils. Also, hydrogenation increases the stability of these fats.

In the case of soybean oil, flavor reversion is still an unsolved problem. Improvements in refining and hydrogenation technics have greatly reduced the danger of reversion. However, shortenings made with high percentages of soybean oil should not be used in products like pre-mixes that may stand for a considerable time between production and use.

The effect of antioxidants on refined cottonseed oils and their hydrogenated products is shown in Table III.

Other Uses

In addition to their uses in edible oils and shortenings, antioxidants play important roles in preventing oxidative rancidity in many fat-containing foods.

Their application to baked products such as crackers, and to prepared mixes, has already been discussed.

In deep-fat frying of products such as potato chips, corn chips, and salted nuts, antioxidants perform two important functions: (1) They retard development of rancidity in the cooking fats, and (2) they prolong the shelf life of the cooked products. By addition of an antioxidant, or combination with good carry-over, to the frying fats, these two functions are performed simultaneously. In the case of nuts, however, shelf life can be extended still further by incorporating an antioxidant in the salt applied to them after frying.

In the case of doughnuts, natural antioxidants present in the ingredients provide ample protection to both the cooking fat and the product.

Addition of approximately 0.01 percent antioxidant to peanut butter has been found helpful in extending the life of the product, especially after the original container has been opened.

Antioxidants are being incorporated in dips used to glaze fish before freezing, and they have been applied to slabs of bacon (in powder form or sprayed on as solutions in oil or water) to prevent rancidification.

Another field in which antioxidants are proving their worth is in the manufacture of wax or parchment papers for wrapping and packaging meats, shortenings, and other fatty foods.

It is on the wrapper or package for these foods that the first signs of rancidity usually appear. This is often due to contact with air, but at other times it is caused by the presence of substances in the paper.

When small amounts of antioxidants are incorporated in the wax or other coatings that are applied to the papers, oxidation of the fatty films formed on the wrappers is inhibited, thus greatly extending the keeping quality of the wrapped product.

Spices Have Antioxidant Properties

A group of antioxidants that has received very little attention comprises natural spices widely used in foods.

In a recent study* 32 spices were ground to pass a 100-

* Chipault, J. R., Mizuno, G. R., Hawkins, J. M., and Lundberg, W. O. "The Antioxidant Properties of Natural Spices," *Food Research*, 46-55, Jan.-Feb., 1952.

Checklist of Sources

You can get antioxidant materials from a number of sources. Among the manufacturers and distributors are:

Tocopherol concentrates	**Distillation Products Industries, Rochester 3, N. Y.**
Hydroquinone	**Distillation Products Industries, Rochester 3, N. Y.** **Tennessee Eastman Corp., Kingsport, Tenn.** **Merck & Co., Inc., Rahway, N. J.** **Mallinckrodt Chemical Works, St. Louis 7.**
Butylated hydroxyanisole	**Tennessee Eastman Corp., Kingsport, Tenn.** **The Griffith Laboratories, Inc., Chicago 9.** **Universal Oil Products Co., Chicago 4.**
Citric acid	**Chas. Pfizer & Co., Brooklyn 6.** **Merck & Co., Inc., Rahway, N. J.** **H. Kohnstamm & Co., Inc., New York City 7.** **Mallinckrodt Chemical Works, St. Louis 7.**
Gum Guaiac	**S. B. Pinick & Co., New York City** **Arthur H. Thomas Co., Philadelphia**
Lecithin	**A. E. Staley Mfg. Co., Decatur, Ill.** **W. A. Cleary Corp., New Brunswick, N. J.** **American Lecithin Corp., New York City.** **Archer-Daniels-Midland Corp., Indianapolis** **General Mills Inc., Minneapolis 1.**
Nordihydroguaiaretic acid	**Nordigard Corp., Chicago 12.**
Phosphoric acid	**Monsanto Chemical Co., St. Louis 4.** **Allied Chemical & Dye Corp., New York City** **E. I. duPont de Nemours & Co., Inc., Wilmington 98, Del.** **Westvaco Chemical Div., Food Machinery & Chemical Corp., Charleston, W. Va.**
Propyl gallate	**Heyden Chemical Co., New York 1.**
Conidendrols	**Crown-Zellenbach Corp., Camas, Wash.**
Ascorbic acid	**Hoffmann-LaRoche, Inc., Nutley 10, N. J.** **Sterwin Chemicals, Inc., New York City 18.** **Merck & Co., Inc., Rahway, N. J.** **Chas. Pfizer & Co., Brooklyn 6.**

TABLE II—CARRY-THROUGH PROPERTIES Are Exhibited by Some Antioxidants*

Antioxidant	Amount Added To Lard (Percent)	Cracker Stability Hr. Unprotected Lard	Protected Lard	Protection Factor
NDGA	0.01	264	600	2.3
NDGA	0.02	264	768	2.9
NDGA	0.05	264	840	3.2
NDGA	0.001	203	213	1.0
Citric acid	0.005			
NDGA	0.002	139	121	....
H_3PO_4	0.002			
Propyl gallate	0.01	192	264	1.4
Propyl gallate	0.05	192	314	1.5
Propyl gallate	0.10	192	336	1.6
Tocopherols	0.01	216	240	1.1
Tocopherols	0.02	216	264	1.35
Tocopherols	0.10	216	288	1.35
BHA	0.02	240	1234	5.15
Propyl gallate	0.003			
Citric acid	0.002			
Propyl gallate	0.0075	289	212	....
Lecithin	0.0075			
Corn oil	0.027			
Citric acid	0.002			

* Figures on NDGA, propyl gallate, tocopherols, from Higgins, J. W., and Black, H. C., *Oil & Soap*, Sept. 1944. Figures on combinations: NDGA and citric acid; NDGA and H_3PO_4; and propyl gallate, lecithin, corn oil, and citric acid, from Kraybill, H. R., Dugan, L. R., Jr., Beadle, B. W., Vibrans, F. C., Swarts, V., and Rezabek, H., *The Journal of the American Oil Chemists' Society*, Sept. 1949. Figures on combination of BHA, propyl gallate, and citric acid, from Dugan, L. R., Jr., Kraybill, H. R., Ireland, L., and Vibrans, F. C., *Food Technology*, Nov. 1950.

TABLE III—STABILITY OF COTTONSEED OIL Is Only Slightly Improved by Adding Antioxidants*

Antioxidant	Amount Used Percent	Cottonseed Oil Unprotected Hr.	Cottonseed Oil Protected Hr.	Hydrogenated Cottonseed Oil Unprotected Hr.	Hydrogenated Cottonseed Oil Protected Hr.
Tocopherols	0.01	9.1	8.3	121	121
Tocopherols	0.05	9.1	7.7	121	131
Tocopherols	0.10	9.1	6.5	121	135
Lecithin	0.01	9.1	10.6	121	172
Lecithin	0.05	9.1	11.3	121	186
Lecithin	0.10	9.1	12.1	121	181
NDGA	0.01	9.1	10.0	121	120
NDGA	0.05	9.1	18.7	121	258
NDGA	0.10	9.1	25.8	121	393
Propyl gallate	0.01	9.1	15.8	121	172
Propyl gallate	0.05	9.1	54.9	121	495
Propyl gallate	0.10	9.1	79.5	121	612
BHA	0.01	9.1	6.6	121	108
BHA	0.05	9.1	7.3	121	158
BHA	0.10	9.1	7.3	121	172

* All figures given are from Moore, R. N., and Bickford, W. G., *The Journal of the American Oil Chemists' Society*, Jan. 1952.

mesh screen and incorporated in prime steam lard at concentrations of 0.2 percent, and all were found to exert antioxidant effects. Rosemary and sage were extremely potent.

In pie crusts, the antioxidant effect was found considerably less than in lard, although several spices did provide carry-through.

Spices tested, together with their antioxidant indexes, were: Allspice, 1.8; aniseed, 1.9; basil leaves, 1.2; bay leaves, 2.1; cardamom, 1.3; caraway, 1.8; cassia, 1.4; celery seed, 1.2; chili, 1.5; cinnamon, 1.3; cloves, 1.8; coriander, 1.3; cumin, 1.3; dill, 1.3; fennel, 1.3; foenugreek, 1.6; ginger, 1.8; mace, 2.6; marjoram, 2.2; mustard, 2.0; nutmeg, 3.1; oregano, 3.5; paprika, 2.5; black pepper, 1.4; red pepper, 1.5; white pepper, 1.2; poppy seed, 1.2; rosemary, 17.6; sage, 15.4; savory, 1.6; thyme, 3.0; and turmeric, 2.4.

Proper Packaging Aids Also

The most extensive efforts toward stabilization of fats by methods other than incorporation of antioxidants have been in the field of packaging. Here, exclusion of oxygen and light by proper packaging is largely used to prevent rancidity. Packaging under nitrogen, or regassing, aims to replace oxygen with inert gas.

Some shortening manufacturers whip an inert gas such as nitrogen into their products. And a similar practice is employed in the manufacture of butter and margarine by continuous processes.

The process of vacuum packaging is used to prevent deterioration of some products, and the combination of removing the air and then packing under nitrogen is employed with products such as butteroil.

INDUSTRIAL ENZYMES . . .

Now Speed Natural Processes

GERALD REED
Rohm & Haas Co., Philadelphia

So practical are the many and diverse uses of enzymes in the food industry that it best serves our purpose to go immediately into the beneficial applications of these agents.

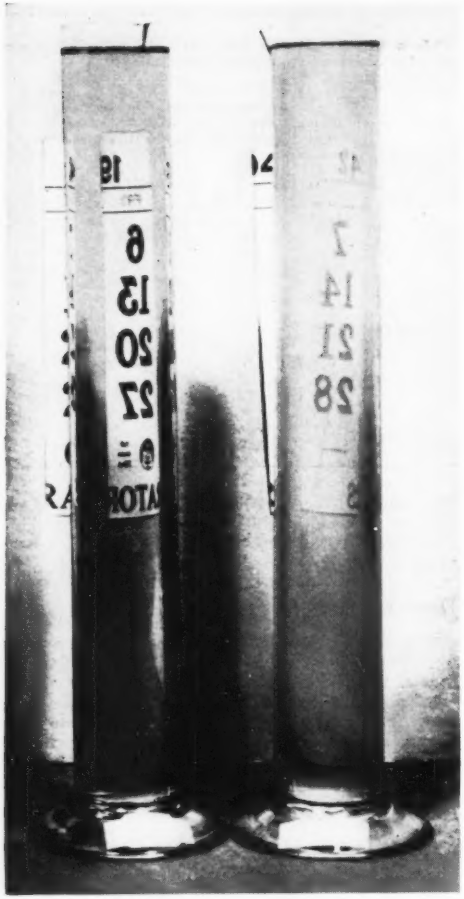
The more scientific points of their special nature are briefed in accompanying panels (pages 107 and 108).

Herein, we will specifically consider such principal enzymes as pepsin (from the pancreas and gastro-intestinal tracts of cattle and pigs); papain, ficin, bromelin (vegetable proteases); malt (a vegetable diastase); and a variety of enzymes from fungi and bacteria.

And particular emphasis will be placed on the newer applications of enzymes of microbiological origin.

They Clarify Fruit Juices

Until recently, cider was regarded as a seasonal drink only, since no method of storing the juice was known



PECTIC ENZYMES hydrolyze colloidal pectin in apple juice and cause it to settle. Note transparency of treated juice in graduate (left), and cloudiness of untreated product (right).

which would prevent fermentation without impairing its flavor. Cooking or pasteurizing by ordinary methods prevented fermentation, but frequently introduced a characteristic "cooked" taste. Canned or bottled juice, therefore, lacked the appetizing appeal of fresh cider.

Research showed that there was a relation between the cloudy appearance of cider and the development of a cooked flavor during pasteurization. It was recognized that the cloudiness was caused by the suspension of tiny pulp particles, these being prevented from settling out by the protective action of colloidal pectin, a natural ingredient of fruit juices.

Chemically, pectins are composed of a chain of galacturonic acid units united by a 1,4-glucosidic linkage and having most of the carboxyl groups methylated. The organic chemist would describe a typical pectin as shown in the accompanying diagram (right).

Pectin cannot be removed by regular filtration processes. However, by hydrolyzing the protective pectin the liquid can be freed of suspended solid matter. Two kinds of enzymes are essential in accomplishing this task. One type, known as pectase, hydrolyzes the methyl ester; the other, pectinase, splits the molecule at the links between adjoining galacturonic acid molecules.

If these enzymes are added to the cloudy apple juice, the colloidal pectin is hydrolyzed and all the insoluble material settles to the bottom. The juice can then be filtered readily, yielding a clear product. Theoretically, pectic enzymes naturally present would eventually exert the same effect as the added enzymes. In practice, the juice would ferment and spoil long before the clarification process was complete.

In the case of apple juice concentrates, depectinization is definitely required, since the juice begins to gel if it is concentrated 5 to 6 times. The commercial concentrate of 72° Brix from depectinized and vacuum concentrated apple juice is prepared on a very large scale in the United States, Canada, and Mexico for use in jelly manufacture.

In the preparation of 4:1 frozen apple juice concentrates, the volatile essence is stripped from the juice. It is added back after the stripped juice is depectinized and concentrated. This type of concentrate has the flavor of freshly pressed apple cider. And it has been test marketed with good success. The Department of Agriculture's Western Regional Resarch Laboratory cooperated with the industry on the project.

The 6:1 concentrates are self preserving because of their high solids concentration. Such products have been prepared from apple and grape juice at the Eastern Regional Research Laboratory. They can be stored at normal refrigerator (non-freezing) temperatures with excellent flavor retention.

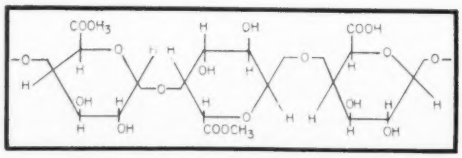
Pectic enzymes are used for the preparation of juices and extracts from grapes, prunes, strawberries, raspberries, cranberries, blackberries, elderberries, cherries, peaches, pineapple, guava, papaya, oranges, and many other fruits. A very interesting application is their use in the clarification of citrus juices that are sold by vending machines. Here, the primary purpose is to prevent clogging of the vending equipment by suspended solids in the juice.

Speed Wine Making

Clarification of wine has ordinarily been accomplished by an aging process, during which pectic enzymes, naturally found in the grape, break down the protective pectin particles, allowing the insoluble, haze-producing materials to settle out. This process varies with the concentration of these enzymes naturally present, and depends upon the ripeness, variety, climate and, to some extent, the handling of the juice.

Historically, the first use of pectic enzymes in the wine industry was on the fermented wine when it did not clarify well. Since then, it has been found advantageous to add them earlier in the manufacturing process, either *during* fermentation or at the grape crusher. Addition of enzymes is particularly useful where the grape is expensive and the value of the free-run juice correspondingly high.

Addition of pectic enzymes directly to the grapes at the crusher frequently results in higher yields of free-run juice—from between 3 to 15 additional gallons of juice per ton.



When added to the grapes during fermentation these enzymes lead to rapid settling of the lees, that is, the insoluble solids that settle out during fermentation. The flocculant material settles in a compact layer, permitting the wine to be drawn off readily.

In general, filtration of the wine is speeded by the addition of pectic enzymes. The enzymes can be used in the must (juice) before fermentation to settle-out unwanted yeasts and other microorganisms. Moreover, it seems that the aging of wine and the development of a mature flavor is accelerated.

Proteolytic Enzymes Help Beer

In the brewing of beer, the enzymatic activity of properly malted barley is sufficient to convert the grain mashes to sugars. However, additional enzymes of microbiological origin have been used occasionally when natural barley enzymes have been inactivated or when relatively high concentrations of rice or corn have been employed as brewers' adjuncts.

The use of proteolytic enzymes—which break down proteins—to chill proof beer is a general commercial procedure in the U.S. Unlike the English, Americans prefer their beer chilled. Certain proteins from the malt or hops coagulate at low temperatures and form a so-called chill haze, which disappears as the beer becomes warm. The proteins responsible for the haze may be hydrolyzed enzymatically by papain or pepsin either alone or in conjunction with proteolytic enzymes of fungal origin. The process must be closely regulated so that the proteins responsible for maintaining the stability of the beer foam are not attacked.

Good for Meat, Too

Tenderizing of meat by partial modification of the proteins with proteolytic enzymes is a very old process, the natives of the West Indies having rendered meat tender and juicy by wrapping it in papaya leaves.

This application has its disadvantages, however. True, the muscle part of a steak, particularly of a thin steak, may be tenderized quite easily with papain—but veins, tendons, and fibrous membranes remain tough. It is hoped here that research will supply a satisfactory enzyme to tenderize parts of the meat that are not readily attacked by the known proteolytic enzymes.

Sausage casings, on the other hand, lend themselves well to tenderizing or softening. Bromelin, an enzyme present in fresh pineapple juice, can tenderize the casing sufficiently so that it may be easily chewed.

In the Baking Industry

Use of yeast or yeast-like materials in the baking of bread is as old as the story of bread itself. Yet, the enzymes of yeast are not the only ones that must be present to produce high-quality bread. These other enzymes, diastatic (starch converting) and proteolytic (protein converting), can be developed in the wheat in a natural fashion. Harvested wheat, stacked in the field, sprouts just enough to develop small quantities of the two classes of enzymes.

After the advent of the harvesting combine, there existed little opportunity for wheat to produce its own diastatic and proteolytic enzymes while stacked in the field. It became necessary, then, to supplement the wheat with enzymes from other sources, namely, malted barley and malted wheat. Present standards of identity for flour recognize the need for supplementation, and include either the malted wheat or malted barley as optionals.

More recently, research has shown that fungal diastases (produced by fungi) and proteases may be substituted for malted wheat and barley, and with several important advantages. What these benefits are will become clear as we continue our discussion.

In bread baking, it is desirable to obtain a dough that has good extensibility and that is retentive enough to prevent the escape of the carbon dioxide expanding it during fermentation. Such doughs are obtained by a slight enzymatic modification of starch and gluten present in the flour. Malted barley and malted wheat can be used to accomplish this slight hydrolysis, but the ratio of diastatic to proteolytic enzymes in these materials is so variable that adequate control over the process is quite difficult.

For example, certain flours result in bucky doughs—doughs difficult to work and handle. These are best treated with an enzyme preparation containing a relatively high level of proteolytic enzyme compared with diastatic enzyme. Malted wheat and malted barley with such properties cannot be obtained.

On the other hand, there are cases where a high level of diastase compared to protease must be employed. Concentrated fungal enzymes, however, can be obtained in almost any desired ratio of the two enzymes.

Fungal enzymes, in general, have the following beneficial effects upon the final bread: Good crust color and loaf volume, and better texture and grain. Texture refers mainly to the softness of the bread; grain to the uniformity and small size of the air cells in the bread crumb. Because the grain of bread made with fungal enzymes is more uniform, the cell walls are thinner, and the bread appears to be whiter. Fungal diastases are inactivated at lower temperatures than malt diastases. Hence, their action cannot continue long in the oven, and will not give a sticky crumb.

Corn Syrup

Production of sweet syrups—corn syrups by conversion of starch—is another application for diastases. It is possible to convert, or hydrolyze, starch with acid. If such hydrolysis is carried too far to obtain maximum sweetness, side reactions occur which introduce a bitter taste. And this taste cannot be removed readily.

High conversion products, however, which do *not* have the bitter taste, may be made by a combination of acid and enzymatic hydrolysis. The process employs a preliminary acid hydrolysis followed by hydrolysis with commercially prepared fungal enzymes to yield a product relatively high in dextrose. Such a product must be stable to crystallization over a wide temperature range.

What They Are

Industrial enzymes are preparations in which the enzyme-active material has been separated from the microorganisms, animal matter, or vegetable tissue producing them.

They may be employed as catalysts (accelerators) in applications involving conversion of a complex natural substance into simpler building stones, and in the reduction or oxidation of naturally occurring organic materials.

Unlike acids and alkalis which perform similar hydrolytic functions, enzymes possess the important advantage of controlling only specific reactions. By their use, many undesirable side reactions, particularly unwelcome in food processing, are excluded.

How They Are Produced

So far as is known, no one has yet succeeded in synthesizing an enzyme—hence living matter (frequently microorganic) is the only source of supply. Not every organism, however, produces every enzyme. And in many cases concentration of a given enzyme may be so low (compared to the impurities) that a practical method of preparing concentrated enzyme may be difficult to find.

As a result, there is a limitation to the number of microorganisms known to produce enough of any one enzyme to be of commercial interest.

Enzymes of actively growing fungi and bacteria are frequently excreted into the surrounding culture medium. In this case, production of enzyme-active preparations consists of growing the suitable organism in a liquid or on a moist solid medium.

After an active growth period of 20 to 60 hr., the medium is extracted with water or salt solutions and filtered to remove the generating organism. The enzyme-active material is then precipitated from the filtrate by means of acetone or ethanol, or by salts such as ammonium sulfate.

The precipitate is dried, ground, and mixed with an inert ingredient such as sugar or starch which serves as a standardizing agent, carrier, and frequently as a dilutent for the active material.

If the enzyme is contained within the cell walls of the generating organism and is not excreted into the medium, it is necessary to plasmolyze the cells prior to extraction. This may be accomplished by rupturing the cell walls through autolysis, or by use of a chemical agent such as amyl alcohol to make the cell wall permeable.

The alcohol-precipitated and dried enzyme material is generally used without further purification. Desired enzymatic activity is obtained through choice of proper generating organism, nutrient medium, and time and temperature conditions of growth.

Use of fungal enzymes permits the production of syrups with a suitable dextrin-maltose-glucose ratio. This ratio influences the sweetness and the tendency of the corn syrup to crystallize, and this composition must be controlled.

It is also relatively easy to prepare a satisfactory syrup by the use of enzymes alone or by the use of a liquifying diatase followed by a mild hydrolysis with acid. Research is now in progress to develop enzymes that will permit the production of crystalline dextrose from corn starch without the use of acids.

Confectionery

Candies with liquid centers (for instance, liquid cherry candies) are made with a sugar paste to which the enzyme invertase has been added. Acting upon the center of sucrose, the enzyme hydrolyzes it to the more soluble glucose and fructose sugars, producing the familiar liquid center.

In the production of milk chocolate, enzymes are also found valuable. Some manufacturers of chocolate prefer to use milk with a slightly cured flavor. This flavor may be produced by innoculation of the milk with certain microorganisms or by the addition of lipase, an enzyme which breaks down, or hydrolyzes, fats. A fungal enzyme serves quite well for this particular purpose. It produces a milk concentrate or milk powder, with a very desirable mild flavor, which can then be used in the production of chocolate.

Diastatic enzymes also find application in the confectionery industry. Some manufacturers of cocoa syrups use them to reduce the viscosity of products containing appreciable concentrations of cocoa starch.

Dairy Products

Ice cream mix consists of approximately 10-12 percent butterfat, 16 percent sugar, and 10-11 percent skim milk solids. For many years, ice cream manufacturers have been interested in improving the nutritional quality of their products by increasing the ratio of skim milk solids to milk fats.

However, if the concentration of skim milk solids is increased above 11-11.5 percent, the milk sugar (lactose) will tend to crystallize in hard needles, producing so-called "sandy" ice cream. This limits the safe range of concentration of these solids.

Several processes have been tried to prevent the occurrence of sandiness—working in principle on either the removal of lactose by prior crystallization or on the addition of riboflavin or certain alkalizing salts to retard the crystallization.

Recently, a commercial enzyme, a lactase, has been developed which permits the hydrolysis of lactose into its two component sugars, glucose and galactose, both of which are sweeter and more soluble than lactose. Treatment of skim milk concentrates with this lactase makes it possible to raise the concentration of skim milk solids in ice cream mixes to 14 percent or higher.

Find Uses in Eggs

In the production of dried eggs it is desirable to filter the egg white before spray-drying. This filtration can be facilitated by the use of small concentrations of proteolytic enzymes. Glucose is present in small quantities in egg whites and whole eggs and must be removed before spray drying. Otherwise, it will react with egg proteins and lead to discoloration and loss of flavor and solubility of the powdered product on storage. Oxidation of the glucose with the enzyme glucose oxidase has now been tried commercially with good success.

Other Uses

In the case of coffee in the "cherry" form (green coffee beans imbedded in a gelatinous material) the beans must be cleaned by mechanical removal of this mucilage, or preferably by a fermentation process. Sometimes, this natural fermentation does not occur spontaneously, or it takes so long (depending on temperature or humidity conditions in the tropics) that undesirable flavors may develop.

Pectic enzymes, when added directly to the pulped "cherries," permit a reduction of the fermentation time from several days to as little as 6 hr. Coffee prepared by the fast enzyme process is of excellent quality. An improvement in quality is particularly noticeable with second grade cherries that are either under-ripe or over-ripe and which do not ferment well.

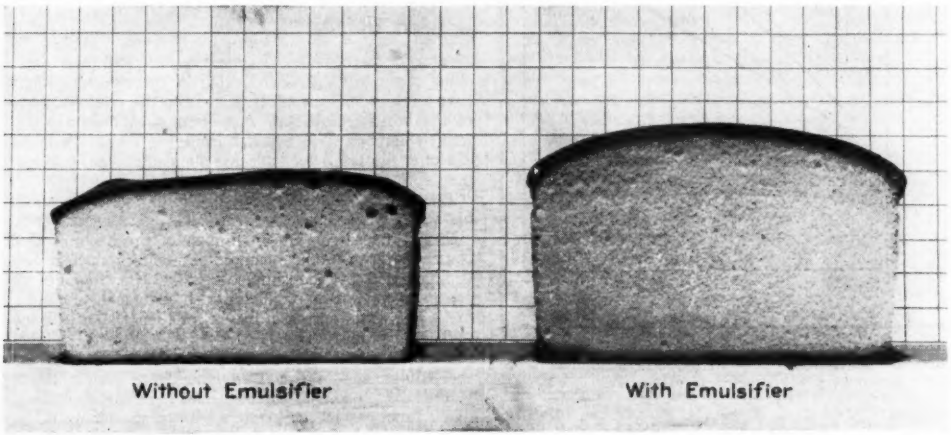
There are numerous other applications in the food industry in which enzyme processes are necessary for the production of desirable flavors and textures—for instance in the curing of tea and cocoa, and the ripening of cheese. It is likely that further research into the mechanism of the curing and ripening processes will lead to the discovery and production of other enzymes that can be then employed to control or to accelerate these natural resources.

These applications and those which have been discussed briefly promise a continuing increase in the number of enzymes which will be produced commercially and in the

number of processes in which they will be employed.

Finally, it must be pointed out that the synthesis of our principal foods—sugars (starches) and amino acids (proteins)—is carried out enzymatically by plants and animals. The simple building stones for many of these processes are sometimes available, and a few of the enzymes involved in these syntheses have been studied.

It is not impossible to visualize an era in which the enzymatic synthesis of our common foods could be undertaken.



IN POUND CAKES, emulsifiers permit the use of more shortening, sugar, and liquids. Such cakes have greater volume, more uniform grain, generally improved texture and tenderness.

FOOD EMULSIFIERS . . .

Bring New Highs In Uniformity

I—Four Types Evaluated

C. D. PRATT and W. W. HAYS

Respectively, Director Technical Div., and Assistant to General Manager, Industrial Chemicals Dept., Atlas Powder Co., Wilmington, Del.

Decided improvement in the eating quality, appetizing nature, and attractiveness of many foods is obtained with the use of emulsifiers. This improvement is particularly, although not solely, applicable to products containing vegetable oils, animal fats, butterfat, cocoa butter, and oil-soluble flavors and vitamins.

Emulsifiers help to distribute, homogeneously, the oil-soluble ingredients throughout the product in very fine particles. Accordingly, after detailing the four main classifications of emulsifiers, we will accent their pertinent use by the baker, the dairyman, the confectioner, and others.

A word first, however, about their ability to distribute fat and oil: This is accomplished through their affinity for both fat and water, which enables these materials to mix more readily.

The fat affinity of emulsifiers is due to the presence of fatty acid portions in their structure, whereas their water affinity results from the hydrophilic portions, usually consisting of a water-soluble polyol having one or more free hydroxyl groups.

Emulsifiers of this general nature vary in their functions and efficiencies in different types of foodstuffs, depending on their balance with respect to fat and water affinity.

A wide variety of emulsifiers, therefore, is required for optimum results.

Classification of Food Emulsifiers

With one or two exceptions, all of the emulsifiers used commercially in foods belong to the non-ionic class of surface active agents. Moreover, with the exception of lecithin, all of the non-ionic types are chemically known as partial esters.

These partial esters are made by combining long-chain fatty acids, such as stearic, palmitic or oleic, with one of the higher alcohols, such as glycerol or sorbitol, or by reacting the whole fat with the polyol.

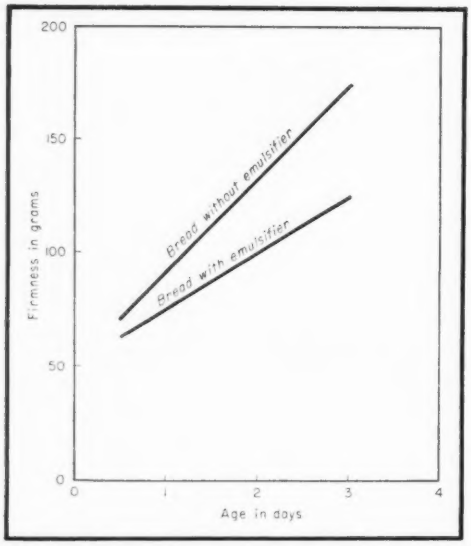


FIG. 1. Polyoxyethylene monostearate and commercial mono- and diglyceride emulsifiers retard firming of bread crumb hence keep the product fresh longer.

Partial ester emulsifiers may be classified in four principal groups, as follows:

1. Partial fatty acid esters of glycerol (commonly called mono- and diglycerides) made by reacting either fatty acids or triglycerides with glycerol.

These partial glycerides differ materially from fats (triglycerides) in that not all of the hydroxyl groups of the glycerine are taken up by the fatty acids, which renders them surface-active.

Although partial glycerides containing a very high monoglyceride content are now manufactured by a distillation process, the commercial products usually contain between 40 and 50 percent of each of the mono- and diglycerides. In order to improve the water-dispersibility of these products, their hydrophilic properties are sometimes increased by the addition of sodium or potassium soaps.

2. Partial fatty acid esters or sorbitan, made by reacting either fatty acids or triglycerides with sorbitol.

During the course of these reactions, water is split off from the sorbitol. The resulting product is a partial ester of sorbitan, that is, a partial ester of mono-anhydro sorbitol. In the case of the sorbitol-triglyceride reaction products, partial esters of both glycerine and sorbitan are formed. In general, this group comprises somewhat more hydrophilic members than the partial glycerides.

3. Polyoxyethylene derivatives of the sorbitan partial esters.

These are still more hydrophilic than groups (1) and (2) and include members that readily disperse in water to form water-clear "solutions." That they are dispersions rather than true solutions is proved by the Tyndall cone test.

Emulsifiers of this group are produced by condensing predetermined amounts of ethylene oxide at the free hydroxyl positions, forming stable polyoxyethylene chains, at the end of which new hydroxyl groups are formed.

4. Polyoxyethylene derivatives of the fatty acids.

This group of emulsifiers is produced by either the direct reaction of predetermined amounts of ethylene oxide with the fatty acid, or by partially esterifying poly-ethylene glycol with the fatty acid. Like group (3) they also comprise products ranging from water dispersible to water-soluble.

As previously mentioned, lecithin is usually classified as a non-ionic surface-active emulsifier. It is generally obtained from soybeans. The fat affinity of lecithin is due to its fatty acid radicals, whereas its water affinity results from its choline-phosphate-hydroxyl groups.

Lecithin is used commercially in several important foods —margarine, shortenings, and chocolate.

In Bakery Products

A major factor in bread staling is the progressive hardening of the loaf with age. Certain of the food emulsifiers have a very significant effect (Fig. 1) on the rate of firming of the bread crumb with age. This phenomenon is extremely important to the housewife. It means that she can offer the bread for table use about a day or so longer than formerly.

Use of these emulsifiers in bread, rolls, and sweet goods has been a major step forward in baking technology. Their ability to retard the rate of firming of bread crumb and consequently to produce a more desirable product is well demonstrated by the simple fact that the majority of consumers prefer the products which contain these emulsifiers. This is the principal reason for their widespread use in bakery products.

For nearly 20 yr., emulsifiers have been added to cake shortenings, and more recently they have been available to the baker and other users separate from the shortening. Their functions in cakes are varied. In shortening cakes, they permit the use of greater amounts of shortening, sugar, and liquids such as milk and eggs. Such cakes have greater volume, more uniform grain, and generally improved texture and tenderness.

Sponge cake, which contains no shortening or oils, is also greatly improved by the addition of certain emulsifiers. Here, a simplified one-stage mixing procedure may be employed. Some of the advantages are a lighter cake, more uniform grain, more tender eating qualities, and better shelf life. Also important is the attainment of greater uniformity of high quality products in day-to-day operation.

In the case of prepared cake mixes, all of the above mentioned advantages result from the use of emulsifiers. And in addition, they serve the very important function of making the cake mix more foolproof.

For consumer mixes, this means that the housewife rarely has a cake failure, and even the novice can repeatedly produce high-quality cakes.

In the case of commercial mixes, these same characteristics will contribute to savings in labor costs as well as to production of uniform, high-quality products.

Fats and Oils

One of the recent outstanding developments in the field of cake shortenings has been the upgrading of plastic lard shortenings with emulsifiers. Whereas in the past lard was generally considered a poor cake shortening, it has now been proved that properly refined lard containing certain emulsifiers makes extremely good shortenings for most types of cakes.

Dairy Products

Emulsifiers are used extensively in the manufacture of ice cream, ice milk, and related products. One of the outstanding advantages in the case of ice cream is that the product containing emulsifiers is dryer and stiffer when drawn from the freezer. This enables the manufac-

turer to fill packages without having the ice cream melt during the operation, thus protecting quality of product and improving sanitation.

In addition, ice cream that is dry at the draw is important in the production of novelties, such as sandwiches, factory-filled cones and individual servings, cake rolls, eclairs, and tarts.

Sale and dispensing of soft ice cream and ice milk in cones and cups directly from a freezer is developing into an important business in this country. To serve these soft products properly, the ice cream or ice milk must be very dry and stiff and stand up well on the cone. As stated above, emulsifiers impart this property.

Millions of gallons of ice cream mix are sold yearly to smaller companies operating batch or counter type freezers. This type of freezer is sometimes not particularly efficient in incorporating air into ice cream, particularly when the blades become slightly worn and need sharpening. In such cases, freezing and whipping time is often overly long and the product becomes soft at the time of withdrawal, resulting in a coarse ice cream. Emulsifiers help to remedy this situation.

Another advantage in the use of emulsifiers is that, by the more rapid incorporation of the necessary air into ice cream, a manufacturer may save 10 to 20 percent in power and time of freezing and whipping. This means more capacity from a given amount of equipment.

Due to the variations in the production of fluid milk, it is necessary for the ice cream manufacturer to use sweet cream butter, plastic cream, or frozen cream at certain times of the year. Employment of such storage dairy products greatly impairs the whipping properties of ice cream unless emulsifiers are added.

Whether continuous or batch freezers are used, emulsifiers help insure the production of uniformly high quality ice cream.

In cream whip that is distributed in pressurized vessels for home, fountain, and restaurant use, certain emulsifiers assist in the formation and stabilization of product. To insure proper texture and stability in the topping as it is dispensed from the container, the butterfat and inert gases must be finely dispersed in the water. Addition of a minute quantity of emulsifier helps accomplish this dispersal.

Confectionery Products

The problem of fat bloom in chocolate has been the subject of much study in recent years. Lecithin has been advantageously used for controlling viscosity of chocolate coatings, but it has little effect on fat bloom.

The favorable effect of certain emulsifiers in controlling fat bloom was first discovered in the course of studies begun at Lehigh University in 1947. This work was under the sponsorship of the Pennsylvania Manufacturing Confectioners' Assn.'s research committee.

In cooperation with the research laboratories of Atlas Powder Co., tests were conducted on a large number of emulsifiers, leading to the development of what appears to be a very effective combination when used in the proportion of 1 percent of the weight of the chocolate. Work on this project is continuing, and results to date are very promising (Fig. 2).

Closely following discovery of the part played by emulsifiers in retarding fat bloom in chocolate, the General Products Division of the Quartermaster Food & Container Institute, working in conjunction with the research laboratories of Paul F. Beich Co., conceived the idea that these same emulsifiers might be the solution to the problem of higher melting fats in coatings.

As the result of the joint research efforts, special high temperature-resistant coatings for use on Quartermaster confectionery rations were developed. These include both cocoa and chocolate liquor types that will withstand temperatures up to 120 deg. F. for extended periods.

Previously, cocoa-type coatings containing high-melting fats had resulted in undesirable products having a paraffin or waxy taste. And low-melting fats were unsatisfactory because of their tendency to bleed out, bloom, and stick to the wrappers.

The new summer coatings, containing emulsifiers and lower-melting fats, are stable at high temperatures, bloom resistant, and highly palatable. The greasy feeling associated with hydrogenated vegetable fats was eliminated, as was the tendency of the coatings to stick to the wrappers, particularly at high temperatures.

Following its success in the application of emulsifiers in solving some of the problems of the cocoa-type bar coatings, the Quartermaster Food & Container Institute directed its attention to the solution of the problem of making cocoa butter and high-melting fats compatible in bars and coatings. Working in close cooperation with the Quartermaster Specifications Committee of the National Confectioners' Assn. and others in the confectionery industry, experiments were conducted on both coatings and solid bars using chocolate liquor instead of cocoa powder.

As the result of this work, solid bars and coating containing chocolate liquor, higher-melting fats, and emulsifiers were developed which have superior physical stability. The new bars received an appreciably higher acceptability rating when compared with standard chocolate bars by a large taste testing panel. Research is continuing along these lines.

Another interesting application of emulsifiers in confections is in pan work, where they reduce the crystallizing time of sugar, make for finer crystals and, as a result, produce more desirable opaque coatings.

In chewy caramels, they impart better chewing properties and reduce the tendency of the confection to stick to the teeth, thereby increasing the palatability and consumer acceptance. In addition, they improve the cutting properties of these caramels.

Emulsifiers are also employed in flavor dispersion in hard candies and in other confections where artificial flavors are employed.

FIG. 2. Fat Bloom in chocolate is effectively controlled by addition of small amounts of emulsifiers.

Another important use of food emulsifiers is for the dispersion of fat-soluble vitamins in aqueous media. And they also find application, in minute quantities, in the dispersion of flavors—for instance, in soft drinks and in the manufacture of pickles.

Still another interesting and valuable application is the use of emulsifiers in compressed yeast to reduce the crumbliness and improve the cutting qualities and the color of the cake.

Development over the past 20 yr. of a variety of emulsifiers which perform important specific functions in food products has been a major technological advance. And while the total number of different food emulsifiers in actual commercial use is relatively small, they cover a wide range of balance with respect to fat and water affinity.

That the improvements in eating quality, appetizing nature, and attractiveness which emulsifiers impart to food products are highly valued is indicated by the consumers' preference for the foods containing them.

II—Glycerides Bridge Gap

E. SCOTT PATTISON

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Mono- and diglycerides are effective emulsifiers due to the presence of both fat-soluble (lyophilic) and water-soluble (hydrophilic) groups within their structures.

Since they are not water-soluble, however, they are not capable of functioning as wetting agents in the same manner as soaps, synthetic detergents and other water-soluble emulsifiers.

Presence of one hydroxyl group in the diglycerides, and two such groups in the monoglycerides, and the mutual solubility of the mono-, di-, and triglycerides—the common fats which have been a basic element of diet since before the dawn of history—accounts for the fact that the mono-

MANY FOODS Are Improved by Adding Partial Ester Type Emulsifiers

PRODUCTS BAKED GOODS	EMULSIFIERS (Numbers in parentheses refer to average number of oxyethylene units in polyoxyethylene chain)	Amount Used (Percent of Food, Except as Otherwise Noted)	Functions
Bread and bread-type rolls	Partial fatty esters of glycerol (mono- and diglycerides)	0.50	Prolongs palatability and softness of bread by retarding rate of hardening of crumb. Aids in producing pliable doughs which machine well.
	Polyoxyethylene (8) monostearate	0.25	Same as above.
Sweet yeast goods	Partial fatty esters of glycerol (mono- and diglycerides)	0.68	Same as above.
	Polyoxyethylene (8) monostearate	0.34	
Shortening cakes	Partial fatty esters of glycerol (mono- and diglycerides)	0.70	Produces finer, more uniform grain, larger volume, and greatly improved tenderness and eating qualities.
	Sorbitan monostearate or palmitate	0.28	Same as above.
	Polyoxyethylene (20) sorbitan monostearate or palmitate	0.07	
Sponge cakes	Polyoxyethylene sorbitan monostearate	0.70	Functions as a whipping agent permitting one-stage mixing. Assures more uniform product, batch to batch, and day to day. Makes lighter cakes with more uniform grain. Improves tenderness and eating qualities.
Prepared cake mixes	Partial fatty esters of glycerol (mono- and diglycerides)	0.70*	Imparts desirable properties, as listed above, for shortening cakes. Also makes mix more foolproof to use, insures a good cake with each mix.
	Sorbitan monostearate or palmitate	0.28 *	Same as above.
	Polyoxyethylene (20) sorbitan monostearate or palmitate	0.07	
FATS AND OILS			
All purpose and cake shortenings (from vegetable and/or animal fats, including plasticized lard shortenings)	Partial fatty esters of glycerol (mono- and diglycerides)	6 to 9	Imparts to shortening same desirable cake-baking properties as listed above for shortening cakes.
	Sorbitan monostearate[b]	2.5	Same as above.
	Polyoxyethylene (20) sorbitan monostearate[b]	0.5	
Oleomargarine	Partial fatty esters of glycerol (mono- and diglycerides)	0.5	Retards leakage of water on storage.
DAIRY PRODUCTS			
Ice cream	Partial fatty esters of glycerol (mono- and diglycerides) + 1 percent soap	0.15	Each makes ice cream dry, firm at draw, aids whip in batch freezers, improves texture, and helps produce a more uniform product from day to day under ordinary plant conditions.
	Sorbitan monostearate	0.12	
	Polyoxyethylene (20) sorbitan monostearate	0.08	
	Polyoxyethylene (20) sorbitan tristearate	0.05	

and diglycerides are capable of making an effective bridge between fat and non-fat ingredients in foods.

In addition, these products have shortening action. Once their multiple functions are recognized, it becomes clear that they have wide application in numerous edible products.

In 1933, the mono- and diglyceride type of shortening was first marketed. This was made by combining 6-8 percent of commercial monoglyceride concentrate (consisting of about 40 percent mono- and the remainder di- and triglycerides) with all-hydrogenated triglyceride shortening.

The new product enabled commercial bakers to make richer and better eating cakes due to the higher amounts of sugar, milk, eggs, and shortening that could be used in relation to the flour in the formula. These richer cakes were recognized as a real improvement, and over the years have had better consumer acceptance than older types.

Two methods of manufacturing the mono-concentrates are current. One is direct esterification of the fatty acid with glycerine, and the other is to react common food fats with excess glycerine.

Concentrates normally used in shortenings are prepared by the latter method. Employed are vegetable oils, lard, and hydrogenated vegetable or animal fats. In concentrates made by this process, the fatty acid distribution is the same as in the original food fats.

Even prior to their use in shortenings, monoglycerides had been employed in making margarine. The purposes were two-fold: First, they helped to overcome the tendency of margarines to "leak" or exude the aqueous phase while in storage, or upon melting. Second, they help to prevent spattering when the margarine was used in deep frying. This use of glycerides has been approved by the

PRODUCTS	EMULSIFIERS (Numbers in parentheses refer to average number of oxyethylene units in polyoxyethylene chain)	Amount Used (Percent of Food, Except as Otherwise Noted)	Functions
Ice Cream (Cont'd)	Polyoxyethylene (20) sorbitan monooleate	0.05	Same as above (preceding page).
	Polyoxyethylene (40) monostearate	0.05	Same as above.
Pressure dispensed cream whip	Polyoxyethylene (20) sorbitan monooleate	0.15	Makes finer and more stable emulsion.
	Polyoxyethylene (20) sorbitan monostearate	0.15	Same as above.
CONFECTIONS			
Chocolate coatings	Sorbitan monostearate[c]	0.60	Retards bloom formation in coatings.
	Polyoxyethylene sorbitan monostearate[c]	0.40	
Summer coatings (chocolate liquor and cocoa types)	Sorbitan monostearate[c]	0.50	Improves palatability and eating qualities of coatings designed to be stable at relatively high temperatures. Minimizes greasy and waxy taste imparted by added high titer fats. Makes chocolate liquor and vegetable fats compatible in coatings.
	Polyoxyethylene (20) sorbitan monostearate[c]	0.50	
Pan work (sugar coatings)	Polyoxyethylene (20) sorbitan monostearate	0.20	Reduces pan time and produces finer sugar crystals resulting in more opaque coating.
Chewy caramels	Partial fatty esters of glycerol (mono- and diglycerides)	0.5	Imparts better chewing properties and increased palatability. Also provides greater ease in cutting.
	Sorbitan monostearate	0.4	Same as above.
	Polyoxyethylene (20) sorbitan monostearate	0.1	
Hard candies	Polyoxyethylene (20) sorbitan monooleate	0.02	Disperses flavor.
	Polyoxyethylene (20) sorbitan monolaurate	0.02	Same as above.
MISCELLANEOUS			
Soft drinks	Polyoxyethylene (20) sorbitan monooleate	0.002	Disperses flavor.
	Polyoxyethylene (20) sorbitan monolaurate	0.002	Same as above.
Pickles	Same as above	0.002	Disperses flavor.
Compressed yeast	Mixed partial fatty esters of sorbitan and glycerol	0.10	Reduces crumbliness and improves cutting properties and also color.
Vitamin drops	Polyoxyethylene (20) sorbitan monooleate	0.06g.[d]	Disperses fat-soluble vitamins in aqueous media.
	Polyoxyethylene (20) sorbitan monolaurate	0.06g.	Same as above.

[a] Based on weight of finished cake.

[b] Combination of sorbitan monostearate and polyoxyethylene sorbitan monostearate has not yet been included in Bureau of Animal Industry regulations for use with animal fats.

[c] Combinations of sorbitan monostearate and polyoxyethylene sorbitan monostearate are not yet included in federally standardized grades of chocolates for use in interstate commerce.

[d] Designates grams per day intake when vitamins are taken as directed.

F&DA in the Standard for Oleomargarine, promulgated in 1940, and in the Revised Standard of 1950.

These glycerides now find wide use in other foods. In ice cream and frozen desserts, monoglyceride emulsifiers give a smoother texture by controlling crystal structure. Candies, salad dressings, peanut butter, cheese, frozen eggs, and bread are some of the other edible products to which they have been applied.

Bread Keeps Fresh Longer

The use of glycerides in bread has been discussed at length in the Bread Standards Hearings. In the following *Findings of Fact* issued by the F&DA in connection with the proposed bread standards, limitations are indicated which are reasonably broad.

"In 1942, mono-and diglycerides in limited amounts, usually not exceeding 5 percent were used in many types of shortenings. Since 1942, experience has shown that even larger proportions of mono- and diglycerides in the shortening still further increase the shortening effect. Although detailed data as to the physical properties of bread prepared with varying amounts of shortenings containing varying amounts of mono- and diglycerides are not shown in the record, it is evident that when mono- and diglyceride content of the shortening does not exceed 25 percent, no properties are imparted by it to bread other than those commonly associated with the use of shortening."

The proposed bread standard, which would allow the utilization of glycerides, lists as an optional ingredient: ". . . shortening, which may contain lecithin and which may contain not more than 25 percent by weight of mono- and diglycerides of fat-forming fatty acids."

Further experimentation with food formulations containing mono- and diglycerides, introduced either with shortening or directly by use of the monoesters or the mixed mono- and diesters themselves, is progressing rapidly.

It is stimulated by the availability of an increased number of "specification" concentrates manufactured from various fatty acid sources and said to give particular performance characteristics.

SEAWEED EXTRACTIVES . . .
Find Versatile Uses in Foods

L. S. STOLOFF

Director of Research, Seaplant Chemical Corp., New Bedford, Mass.

Refined hydrocolloids, now being prepared from seaplants, are particularly suitable for gelling, binding, bodying, thickening, suspending, stabilizing, and precipitating purposes.

They are standardized for specific uses—by proper selection of raw stock, controlled refining procedures, and final blending in accordance with laboratory tests.

Most types are free-flowing flaky powders, light amber to colorless, that pass through a 40-mesh screen. Odor and flavor of the colloids are very slight or entirely absent. They are water soluble, and solutions are easily prepared, provided precautions are taken to avoid lumping due to rapid water pick-up.

Such precautions include vigorous agitation, use of physical dilutents in the formula, presolution of the water-absorption retardants, and low water temperature. Where retardants are employed, heating is necessary to insure complete solution. Temperature required will depend upon the concentration of the retardant. Agitation and pH of the liquid influence rate of solution, which increases with agitation and lowering of the pH.

What They Are

These seaplant colloids are essentially mixed salts of a polysaccharide built primarily of galactose units, which account for about two-thirds of the total organic matter. From best available estimates, the average molecular weight is approximately 200,000.

In decreasing order of magnitude, associated cations are sodium, potassium, calcium, and magnesium, plus traces of all other basic elements found in sea water. The degree of sulfation is fairly high, as evidenced by a 25-30 percent sulfate content.

Solutions of these extractives are ionized, thus resulting in a negatively charged polymer. This accounts for their reactions with proteins and other macromolecules containing positively charged groups. Significant is the suspension of fibers; as in milk or in precipitation of undesirable proteins in ale and beer. Also of value is the "custardizing" of milk and products containing milk solids, such as prepared custards, cheese spreads, and ice cream.

The increased viscosity exhibited by nearly all solutions is proving extremely useful in obtaining uniform consistencies in food products as well as developing the mild body desirable in soups, syrups, and fountain drinks. Because of the stabilizing action of these solutions on emulsions, suspensions, and foams, they are utilized in sauces, flavoring emulsions, dressings, meringues, and whipped cream.

Formation of thermally reversible gels can be achieved with these colloid solutions. The formation, strength, and setting temperatures of the gels are influenced by the use of retardants, especially the inorganic salts and, more particularly, salts of potassium, ammonium, and calcium. Such gels have found application in milk and water desserts, also in pie fillings. The binding properties are likewise proving helpful in bakery-product glazes and canned pet foods.

Emollient and demulcent properties exhibited by these colloid agents are now being found exceptionally useful for mellowing the flavor and improving the "mouth-feel" of a number of fruit and other food products.

Other properties are employed to modify ice-crystal

growth as in the preparation of strawberries for ice cream. For protection of frozen foods such as fatty fish—mackerel fillets and salmon steaks—advantage is taken of the antioxidant, thickening, and emulsion stabilizing properties.

Seaplant colloids, when shipped in the dry state, are not subject to insect infestation or spoilage by microorganisms. However, solutions are fertile media for bacteria and molds, and measures should be taken to prevent their growth.

When dry, these colloids are adequately stable under normal storage conditions. Degradation of the polymer, however, is accelerated by extreme heat and humidity. Consequently, these colloids must be stored in a cool, dry place.

Solutions of the hydrocolloids will degrade when exposed to high temperatures for prolonged periods. Degradation is accelerated with decreasing pH and increasing oxidation potential. In solutions with a pH above 6.0, normal processing times and temperatures do not result in significant loss of strength.

Where pH's below 6.0 are encountered, loss of strength is sufficiently rapid so that these seaplant extractives should only be exposed to high temperatures for short periods, and some adjustments must be made for losses.

Below a pH of 4.0, shelf-life of the colloid solutions begins to become seriously affected, and below 3.5 it is practically impossible to employ heat.

While information on oxidative changes is meager, strong oxidizing conditions should be avoided. Moderate concentrations of peroxide or hypochlorite can result in almost complete degradation in a matter of minutes.

Now to how these colloid agents are used in various food products:

In Dairy Products

Refined Irish moss extractives are effective stabilizers for chocolate milk drinks. They keep cocoa fibers from settling, prevent fat from rising, and impart a desirable body. Three types of stabilized chocolate flavoring—hot-process syrups, hot-process powders, and cold-process syrups—are sold to dairies. Specially refined extractives are employed for both hot and cold processing formulations.

Hot-process syrups are mixed in a volume ratio of 1 part syrup (0.4 percent extractive) to 12 parts milk (2 percent butterfat). Mixture is heated in ordinary dairy equipment to 145 deg. F. for 30 min., cooled over a surface cooler to 45 deg. F., and bottled.

Hot-process powders are handled in the same way as hot-process syrup, except that 18 lb. of dairy powder and 50 lb. of sugar are added to 100 gal. of 120-deg.-F. milk (2 percent butterfat) to prevent serious lumping. The product is then pasteurized, cooled, and bottled.

Cold-process syrups are mixed in the ratio of 1 part by volume of syrup to 11 parts of milk (2 percent butterfat). The product is mixed in milk cans or ordinary dairy equipment sufficiently to insure complete dispersion of chocolate syrup. Then it is poured over a surface cooler to reduce the temperature to 45 deg. F. before bottling. Cold process syrup is similar in formulation to the hot process, except that a cold-mix stabilizer is employed.

When prepared with seaplant colloids, these puddings set up fast, do not skin over or toughen during storage, are easily removed from molds.

A typical package of pudding might contain: Cocoa, 18.8g.; sugar, 63g.; refined Irish moss extractive, 1.25 g.*; salt, 1.09g.; and vanillin, 0.1g.

In ice creams, processors employ fudges and fruits to produce ripples, layers, or pies. These fudges and fruits are used as high-solids sherbets, which have the same texture and melt-down characteristics as the ice creams.

Sherbets with a soluble-solids content greater than 50 percent will not freeze at ordinary ice-cream storage temperatures. Most ice creams have a 40-50 percent solids content.

VERSATILE colloids recovered from Irish moss and other seaweeds are modified and standardized to afford food industry users a wide variety of profitable opportunities for improving both products and processes.

Desired melt-down characteristics are obtained by using gelling type extractives at a concentration of approximately 0.5 percent. The desirable viscous characteristic is obtained by agitating the syrup during cooling to prevent formation of a gel structure.

Brewing

In brewery use, 3-4 lb. of cleaned, ground, unbleached Irish moss, blended to uniform strength, is added to 100 bbl. of wort as soon as boiling starts in the kettle. Colloid extracted from the moss by the hot wort reacts with proteins to give a fast, hot break. Outstanding benefit of the use of this moss occurs after the wort is cooled—when a second coagulation occurs. This coagulation carries down all the less soluble materials, leaving a clear wort in which the yeast may act.

French Dressing

The use of refined Irish moss extractives simplifies the preparation of French dressing and results in a stable product with good fluidity. No change in present formulations is required, except for removing any stabilizers already present. The hydrocolloid is introduced at a concentration of 1.25 percent of the water and vinegar, and it is mixed a few minutes with rapid agitation. The stabilizer must be added slowly to prevent lumping.

Oil is added to this solution during agitation to produce a coarse emulsion, which is then passed through an homogenizer or colloid mill. The remaining ingredients—sugar, salt, spices, and tomato products—are added to the permanent emulsion with moderate agitation, and the dressing is bottled.

A short water gel (non-chewy, non-elastic, melt-in-the-mouth type) can be prepared by employing a refined Irish moss extractive containing potassium chloride. Significant

* By selection of extractive types and concentrations, a wide variety of textures may be obtained within the blanc mange group. Modifications of the starch types now on the market can be made by adding 10g. of corn starch, or 5g. tapioca starch to the above formulation and reducing the quantity of extractive to 1g.

features are quick setting of this new prepared gel in a water mix without refrigeration, and unmolding of the gel cleanly without need of a hot-water dip.

Typical formula for a 3-oz. package: Sugar, 79.5g.; refined moss extractive with potassium chloride retardant, 3.5g.; monosodium citrate 2g.; flavor and color.

Composition of aspic salad mix (per package) is: Dehydrated vegetable mix, 30g.; dehydrated garlic powder, 0.05g.; dehydrated onion powder, 0.1g.; salt, 5g.; and refined moss extractive with potassium chloride and locust bean gum, 5g.

To prepare, mix garlic, onion, salt, sugar, and stabilizer. The vegetable mix must be weighed and packaged separately, since it does not mix well with other ingredients.

Frozen Fish

Refined moss extractives are used as a carrier for antioxidants, particularly ascorbic acid, for protecting frozen fatty fish from rancidity. The extractive itself contains an antioxidant system which is synergized by the ascorbic acid. When used as a spray or dip it provides a coating that acts as a barrier between the air and the fish. Because this system does not depend on diffusion, the composition of the coating bath remains essentially the same during the entire dipping process.

The dip coating is prepared by mixing a 0.5 percent solution of the extractive with 0.3 percent ascorbic acid for 15 min. This solution is applied to the product by dipping or spraying.

Bakery Products

Meringues are made with refined seaplant extractives. Employed is a whip powder containing egg albumin, 40g.; soy albumin, 5g.; moss extractive, 5g.; and sugar, 35g. This powder is added to 1 qt. of water, stirred until dispersed, whipped at high speed until maximum foam is obtained, and then whipped at high speed with addition of 2 lb. sugar.

Icings made with refined seaplant extractives have improved stability. Concentration normally employed is about 2 percent of the water present. These stabilizers are particularly effective in cream and whipped-type icings.

Seaplant colloids emulsify syrups in icings with shortening, and thus resultant butter creams are not so greasy. Moreover, these colloids set-up or "custardize" milk to enhance the richness of icings.

Fruit Pies

In general, fruit pies that have been stabilized with the refined moss extractive hold together well and show less fluidity and soaking of crust. And no added taste is carried to the fruit.

Moss extractives combined with locust bean gum and potassium chloride, ranging from 0.3-0.5 percent of the filling formulation, are adequate for proper fruit-pie stabilization. The stabilizer can be added premixed with the fruit or sugar, or by any other method that will insure distribution.

Because of the solubility of the hydrocolloid, even at the sugar concentrations employed, no special precautions are required, except checking of the acidity. When tart fruits are used, the pH should not go below 3.5, otherwise excessive loss of stabilizer strength will occur. The pH may be adjusted above 3.5 with the aid of the buffer salt, sodium citrate.

Bakers can mix the stabilizer plus buffer salt (if required) with sugar. This mix is then blended batch-wise with the fruit, or it may be added in separate measured amounts to the fruit in the pie shell. If a cooked syrup is employed, the stabilizer can be dissolved in it after premixing with a portion of the sugar. Or it can be mixed with the drained fruit.

Canners will probably prefer to disperse the stabilizer (plus buffer if needed) in the syrup to be added to the fruit. Premixing of the stabilizer with a small portion of the sugar will aid in dispersing it.

Freezers will find it easier to make a premix of the stabilizer in the sugar to be added to the fruit. If syrup is added to fruit, stabilizer may be water-dissolved, using about three times its weight of sugar to aid dispersion before introducing remaining sugar.

Other New Ingredients

The present report cannot be considered complete without mention of at least two additional new ingredients that have found a number of applications in the food field.

Sorbitol, **a hexahydric alcohol produced by the hydrogenation of sugar, has two important uses in the food industry—as a humectant conditioning agent, and as a nutritive sweetening ingredient of special foods for persons on restricted-sugar diets.**

It is sold in either powdered crystalline form, or as a 70 percent aqueous solution. For economic reasons, the latter is commonly used. It has a cool, sweet taste, and about the same level of sweetness as dextrose. Its nutritive value is essentially the same as that of common sugars.

Although sorbitol is glycogenic and metabolized in the same fashion, it is absorbed and metabolized more slowly than sucrose, dextrose, or glycerine. It is this characteristic that makes it preferable to sugars for the diabetic patient.

This agent has been included in the Quartermaster Specifications for chocolate fudge, coconut creams, vanilla creams, and grained caramels. In addition to these uses it is employed in grained marshmallows and nougats for improving texture and eating quality, even after storage under severe conditions. In these confections, the required amount ranges from 3 to 10 percent sorbitol solids, depending on the particular type product and effect desired.

In shredded sweetened coconut, it improves flavor and helps keep the product moist and flexible. Here, sorbitol is customarily added with other ingredients in the form of a syrup. Its optional use in prepared sweetened coconut is federally approved.

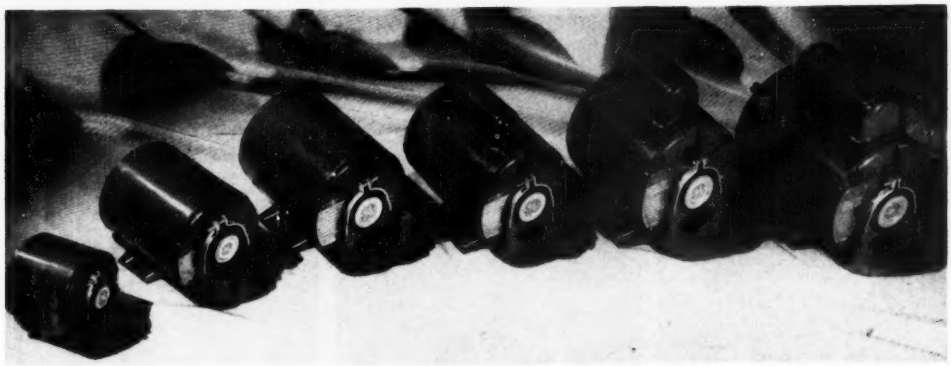
Other uses: In chewing gum, glace fruits, beverages, and flavor preparations. For packaging materials it is used as a plasticizing and conditioning agent. Examples: Bottle cap liners, bottle seals, container coatings, wrapping papers and paper bags particularly of the glassine type.

Sodium carboxymethylcellulose **(CMC) is a water-soluble cellulose material with efficient water-retaining properties that make it very effective as a general purpose stabilizer.**

In frozen foods, it prevents ice crystals from becoming objectionably large. It acts as a thickening agent in such bakery products as glazes for rolls, marshmallow icings, meringues, and fruit-pie fillings.

CMC is used in French and salad dressings as an emulsion stabilizer. And as a stabilizer for ice cream and other frozen products it is very efficient at concentrations ranging from 0.15 to 0.20 percent.

NEW EQUIPMENT & SUPPLIES



Weight, Space Cut on Fractional HP. Motors

Lightweight, compactness, and streamlined appearance are features reported for a new line of fractional hp. motors.

Designated as "Form G," motors are considerably smaller in size, and their weight per hp. has been reduced as much as 51 percent below former models they replace. At the same time, their versatility of application is termed broadened.

Motors are available in open drip-proof and totally enclosed fan-cooled models in Types K (polyphase), KC (capacitor start), KH (split phase), and KCP (permanent split capacitor).

In all ratings, motors have a family resemblance. Steel shell, end shields, and capacitor housing combine to form a smooth contour. Ventilating opening and air escape louvers are part of steel shell; terminal board and thermal protection (when used) are inside.

Blue-gray, baked-on enamel finish is stated to have high qualities of adhesion with resistance to abrasion, oil, high humidity, and heat and cold shock.

Lighter weight and smaller size is reported achieved by a balanced electro-thermal design plus more effective ventilation and use of aluminum for structural parts.

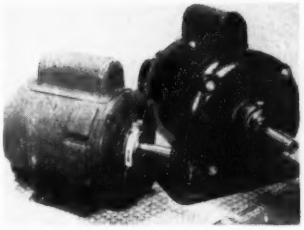
Improved double-end ventilation is stated to keep open drip-proof motor cool under continuous loads and to deter accumulation of dirt inside.

New insulation system is reported to withstand moisture, oils, mild acids and alkalis, and aging. Leads for motor are of a new braidless Neoprene designed to retain flexibility and insulating strength.

Motor is recommended for all-angle operation, and is capable of absorbing moderate thrust loads. Open drip-proof motors may be rotated in base cradle as desired so that drip-proof feature is retained, with ventilating holes maintained in proper position.

Base and shell are of welded steel and will hold motor in proper alignment in any mounting position. Die-cast end shields are reinforced. Cast-in ventilating fins and grids protect personnel, add no extra weight.

For use where extra protection against dust, dirt, moisture, and foreign matter is desired, the totally enclosed fan-cooled motor requires little more space than the standard drip-proof. All ratings are in same frame diameters as equivalently rated open drip-proof motors. A slight increase in length accommodates the extra fan.

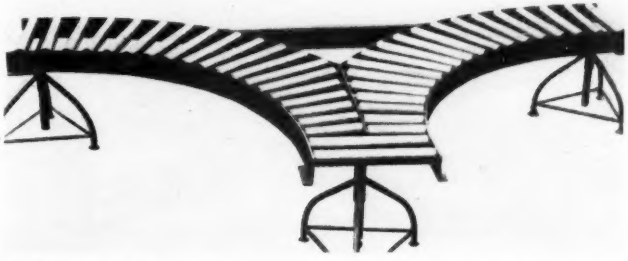


New . . . . . Old

New enclosed ventilating system uses both radiation and convection for cooling. External air enters through openings in shaft-end shield, is forced through louvers, and is then circulated back over body of motor.—*General Electric Co., Schenectady 5.*

Circle 117A on Reader Service Card

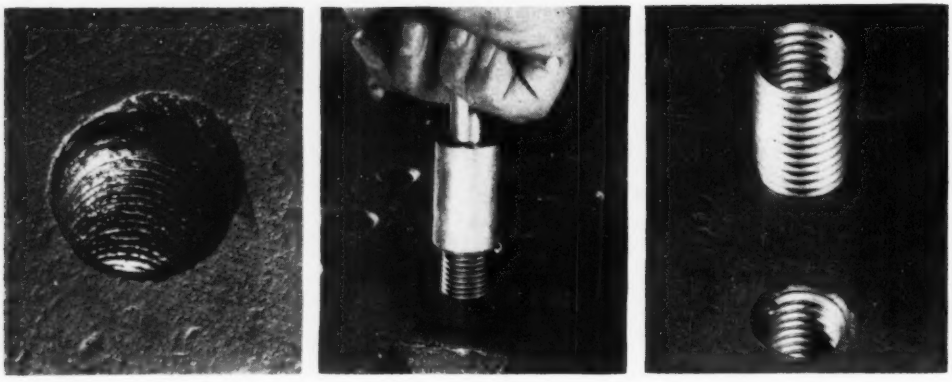
Conveyor Section Ties Two Into One



THIS new converging section for conveyors is intended for use where it is necessary to have two lines lead into one, or one line branch into two. Units are available for all roller conveyors ranging from 6 to 36-in. widths.—*Sage Equipment Co., Buffalo 13.*

Circle 117B on Reader Service Card

Wire Inserts Reduce Equipment "Down-Time"



Through use of new stainless steel helical-wire thread inserts, equipment "down-time" is stated to be greatly reduced wherever machine operations are impaired by stripped or worn threaded holes. Notable time and cost savings have been reported using this insert method.

In addition, inserts are said to provide higher loading strengths and to be more resistant to wear and corrosion than original threads.

Tapped threads in industrial castings—automotive fuel pumps, diesel engine cylinder blocks, air conditioning fan bases, electric motor cases, pump housing castings, and also business machines—may be restored with these inserts.

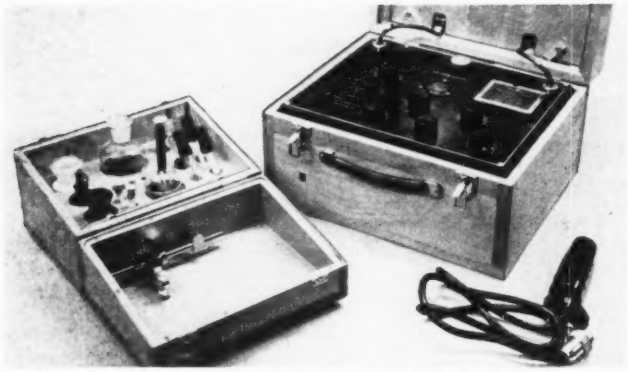
They are available in the following standard thread classifications: 4-40 to 1¼-6 sizes in the National and Unified Coarse thread series; 6-40 to 1¼-12 in the National and Unified Fine thread series; 10-1.0 mm. to ⅝-18 in the automotive spark plug series; and ¼-27 to 1-11½ in the pipe thread series. Inserts are supplied in one, one and a half, and two diameter lengths. For special applications, non-standard threads and sizes can also be supplied.

Operation requires only the cleaning out of the damaged thread (left photo), then the re-tapping of the hole with maker's taps, and finally placement (center) of wire-insert in the re-threaded hole (right).

Inserts are slightly larger than the hole into which they are installed, thus are self-locking. Vibration will not loosen them, states maker. They can be readily removed with a special tool if necessary.—*Heli-Coil Corp., 1184 Shelter Rock Lane, Danbury, Conn.*

Circle 118A on Reader Service Card

Meter Provides Fast, Exact pH Measurement



Quick, accurate measurements of hydrogen-ion concentrations can be made with this new, precision-built Universal pH Meter.

Designed for laboratory research and industrial testing purposes, it provides a measuring accuracy of 0.01 pH over a range of 0 to 14.15.

Meter is supplied with the new, removable calomel and glass electrode and is provided with controls that correct for temperature variations and for asymmetric potentials. There is a built-in cadmium standard cell and a flexible cable with a plug for connection to a 60 cycle a.c. circuit. Transformer taps can be changed to accommodate voltages of 110, 125, 145, 200, 220 and 245. Compactness of the unit makes it readily portable.

Meter is enclosed in a wood cabinet measuring 16⅜ in. long, 13⅜ in. wide, and 10 in. high. Weight is 46 lb. An auxiliary chemical assembly enclosed in a wood cabinet measuring 11¼ in. long, 8⅜ in. wide, 7½ in. high, and weighing 11½ lb. is available as an accessory.—*Research & Control Instruments Div., North American Philips Co., Inc., 750 S. Fulton Ave., Mount Vernon, N. Y.*

Circle 118B on Reader Service Card

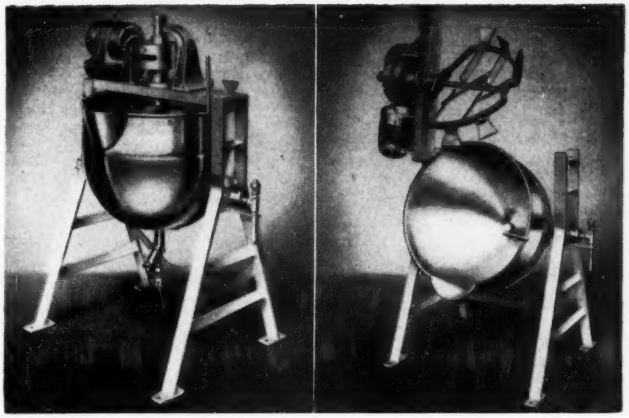
Mix-Cooker Has Easy-Removable Agitator

This new tilting-type kettle can be used two ways—either as a mixer or cooker.

Unit is equipped with a special agitator designed to provide thorough, double-motion mixing. It can be quickly removed when kettle is to be used to cook products that do not require powered agitation.

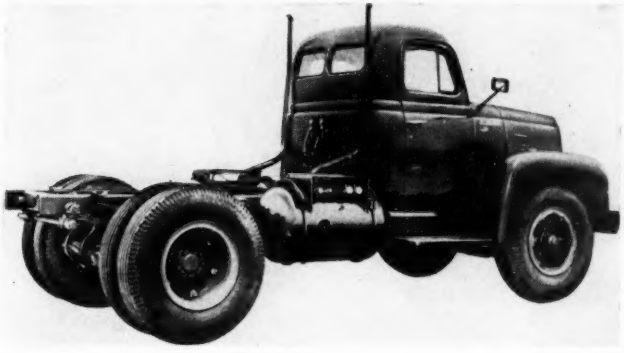
Special tilting feature aims to permit easier removal of contents. Kettle can also be drained through discharge valve at bottom.

Mix-cooker can be furnished with either stainless steel or maplewood scrapers on a double-motion agitator. Kettle is steam-jacketed, 100 to 125 lb. pressure, and is made according to ASME code.—*Hamilton Copper & Brass Works, 820 State Ave., Cincinnati 4.*



Circle 119A on Reader Service Card

Offers Propane-Butane Powered Trucks



Factory-built, Underwriters'-listed, propane-butane fueled trucks have now been added to the International Harvester line.

The new LP-gas (propane-butane) engines are optional on all of the maker's truck models that have been equipped in the past with the heavy-duty Super Red Diamond engines. New LP trucks include the 185, 195, and 205 Roadliners, and all other vehicles in the L-185 through LF-210 series.

Maker states there are a number of benefits in operating efficiency and cost to be derived in using the high-octane LP fuel.

Potential production of this fuel is termed large, with costs in most states currently running several cents per gallon cheaper than gasoline. LP-gas is available at approximately 4,000 bulk distributing plants in the U. S.

Large LP fuel tanks, standard on the new trucks, permit run as far as 400 miles on a single fueling. Fleet operators, according to manufacturer, will also find that the life of motor oil is considerably lengthened, because use of LP-gas eliminates the washdown of lubricating film and oil dilution. This makes for a cleaner engine, hence reduced maintenance costs.

High-octane qualities of LP allow higher compression ratios on the three engines employed—the "372," "406," and the "450."

By incorporating LP carburetion, cold manifolding, and other refinements, advantage can be taken of combustion qualities whereby carbon sludge and gummy deposits are curbed.

Manifolding arrangement is entirely new, with engine operation depending upon a cold induction system free from hot spots. This was effected by completely divorcing intake and exhaust manifolds, eliminating the connection between the manifolds as it exists at the present time in the standard engine.

Standard gasoline tanks have been replaced by heavy-steel, dual, 62-gal. liquid-measure tanks, Underwriters' listed. They are filled to approximately 90 percent capacity, depending upon temperatures, with allowance of space above the liquid for expansion. Tanks are designed to properly store fuel under all operating conditions.

The tanks are refilled at service stations by pumping fuel in liquid form through a hose fitting, which is attached to fill valve on pressure tank. Safety features include: Vertical venting pipes extending above cab to permit discharge of relieved gas into atmosphere; seal caps and automatic excess flow shut-off valves on fuel tanks and in lines; electric shut-off valve; and extreme high-pressure lines and fittings.—*International Harvester Co., 180 N. Michigan Ave., Chicago 1.*

Circle 119B on Reader Service Card

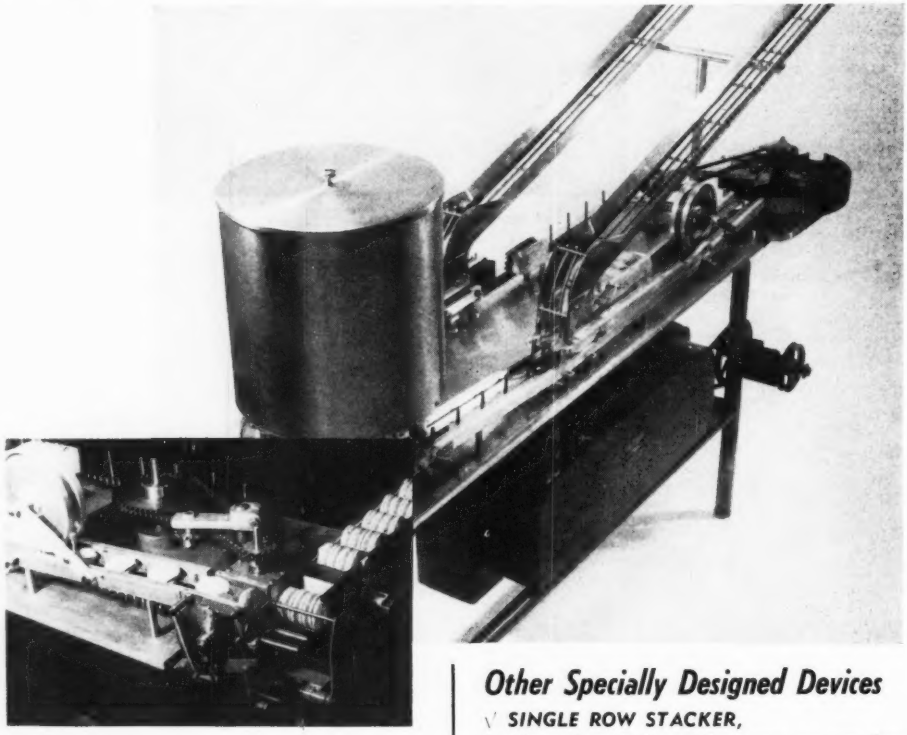
Fowler-Minder Sandwich Machines produce over 600 sandwiches per minute . . . *at savings to you!*

Here is an important machine which enables you to produce 600 or more sandwiches per minute . . . the FOWLER MINDER Sandwich Machine, designed for speed, versatility and economical maintenance, from which you will obtain greater profits. It's fast—sturdy—and labor-saving, only two girls required in its operation; with three more picking up the finished sandwiches.

It features such profitable advantages as adjustable chutes to allow close rolling to ovens to speed up the oven-to-filler-to packaging process, resulting in added freshness, improved taste and aroma . . . a complete rotary movement . . . sturdy construction . . . two chutes . . . variable speed selector to limit the speed to your specific need.

Illustrated below is one of the several devices available at additional cost. In use, they have quickly proved their usefulness.

For full details on this outstanding sandwich machine, we invite you to write today.



COUNTER DEVICE

counts four or more sandwiches from the FOWLER-MINDER Machine and wipes them into a bucket-type conveyor for wrapping. Counter is synchronized with wrapper conveyor.

Other Specially Designed Devices

√ ***SINGLE ROW STACKER,***
done in metal troughs from which operators can move them to containers.

√ ***STACKERS***
for 2, 3 or 4 rows, in metal troughs.

√ ***THREE HIGH STACKER,***
but, with certain types of cookies, they may be stacked 2 and 4 high. This enables ease of handling to certain types of conveyors.

Quality MACHINE COMPANY
265 W. WASHINGTON STREET ● ATHENS, GEORGIA

Ultra-Violet Lamp Fixture for Hazardous Areas

Of interest to processors having explosion hazard areas is this new type EVF germicidal lamp fixture.

It employs a tube of explosion-resisting Vycor glass to house the lamp. Fixture is sealed at each end into aluminum end-castings with threaded covers for access and relamping. Vycor was selected for its high ultra-violet transmission.

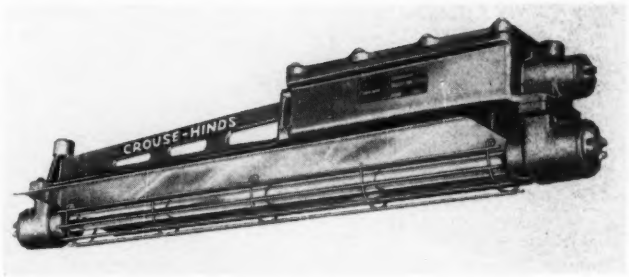
A rigid aluminum ballast housing and extension piece support the two tube end-castings. Each end is supplied with a ½-in. conduit hub for mounting. Several flexible and rigid attachments are available for convenient mounting of the fixture in any position.

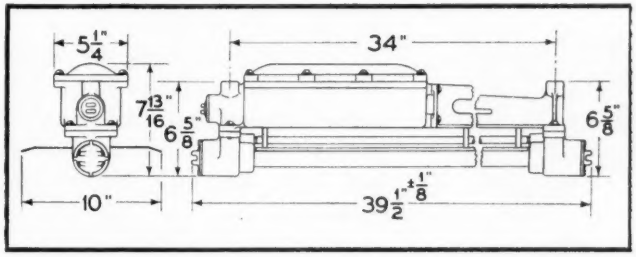
Entire unit is constructed in accordance with Underwriters' Laboratories' requirements for equipment for Classes I and II, hazardous locations.

A reflector can also be supplied to protect personnel from direct ultra-violet radiation, also a guard to prevent tube breakage. Reflector can be mounted either above or below the lamp, depending upon the position in which the fixture is used.

Fixture is designed to accommodate General Electric or Westinghouse single-pin G36T6 Slimline germicidal lamps.

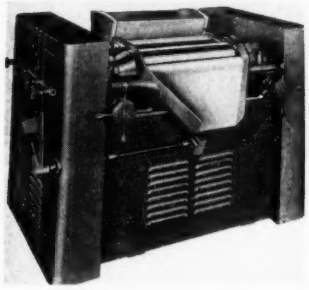
These lamps produce ultra-violet energy at a wave length of 2,537 Angstroms, which has proven most effective in killing airborne bacteria, viruses, yeasts, molds, and fungi. Rated lamp life is 6,000 hr. Life average of ultra-violet radiation is 7.79w., and the life average of ultra-violet intensity in microwatts per square centimeter at 1m. is 68.4. While lamp is rated at 32w., there is a ballast loss of 16w., resulting in a total of 48w. input for the fixture. —*Crouse-Hinds Co., Syracuse 1, N. Y.*





Circle 121A on Reader Service Card

Three-Roller Mill Has High Output



Higher quality grinding and increased production are reported using the new No. 52, 14 x 32-in. and 9 x 24-in. three-roller mills.

Stated to incorporate many improvements, the mills feature dispersion or particle size reduction along full production face of rolls, with new type, easily removed hoppers riding off outside taper of rolls. Thin-wall roll construction and full length water cooling are employed, aimed to assure uniform grinding and temperature control.

Rolls turn at specially determined differential speeds. Front roll rate of 350 rpm. is used without excessive heating due to bored cooling chamber.

Mills are termed extremely quiet in operation, using heavy self-aligning roller bearings throughout the helical gears that operate in continuous oil bath.

Mills feature a balanced apron to make for uniform pressure of the thin take-off knife along full roll face and to eliminate scoring of roll ends. Apron is readily detached for cleaning.

Parallel roll settings at desired pressure are obtained with calibrated dials. The settings are direct.

Frame of each mill is of solid one-piece cast construction for maximum rigidity to eliminate vibration and to assure roll alignment under severe working conditions. Motor is mounted inside mill frame. Single speed is standard, however two-speed motors are furnished where required.—*Charles Ross & Son Co., 148-156 Classon Ave., Brooklyn 5, N. Y.*

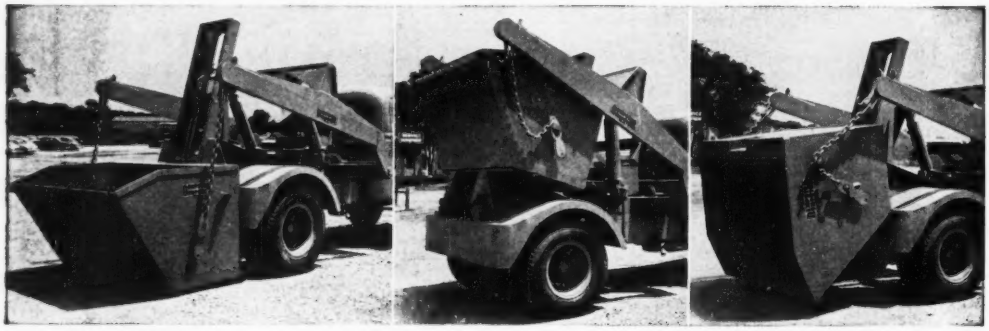
Circle 121B on Reader Service Card

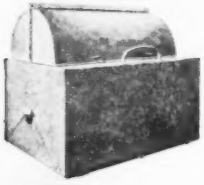
Want More Information?

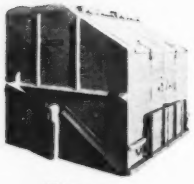
It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard just inside the back cover. Then sign at the bottom and mail. No postage is needed.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.

How The Dempster-Dumpster System Cuts Cost of Equipment . . . Eliminates Re-Handling of Materials!





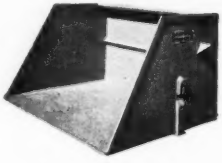


One Truck-Mounted Dempster-Dumpster Picks Up, Hauls and Dumps Scores of Pre-Loaded Containers, One After Another, Regardless of Size or Design for Handling Liquid, Solid, Trash, Dust, Light, Heavy or Bulky Materials.

You can eliminate large investments in trucks, reduce the cost of gas, oil and maintenance . . . avoid time lost by loading crews while trucks make haul . . . and eliminate re-handling of materials by installing the Dempster-Dumpster System!

In the first place, three to five conventional dump trucks with crews cannot possibly do as efficient and economical a job as one truck-mounted Dempster-Dumpster with only one man, the driver. Dempster-Dumpster Containers are spotted at convenient accumulation points inside and outside your plant. The driver and his Dempster-Dumpster are constantly on the move servicing one loaded container after another. The Model LFW Dempster-Dumpster illustrated above handles containers up to 12 cu. yd. capacity. Containers up to 21 cu. yds are available for use with our Type ARLF and Type DTLF Dempster-Dumpsters. Your Dempster-Dumpster and driver may be handling liquids on one haul, solids on another, waste materials on another, etc. The Dempster-Dumpster driver can pick up a load, put it in carrying position and dump it in 2¼ minutes!

Without question, the Dempster-Dumpster System is the most economical and most efficient method of plant materials handling by truck yet devised! Write today for complete information. Manufactured exclusively by Dempster Brothers, Inc.



DEMPSTER BROTHERS, 752 Shea Building, Knoxville 17, Tenn.

Cleated Belt Speeds Cooling of Cans

Fast and thorough cooling of cans of food is stated accomplished in this system utilizing cold water sprays and a unique rubber belt conveyor.

First installation (see p. 98, Dec. 1950, *Food Industries*) was made in the Hapco Cannery, one of Dole Pineapple Co.'s largest packing plants. Canner's engineers conceived the idea that hot cans could be continuously shaken in cold water to insure quick cooling of entire contents (not merely the outside layer of fruit).

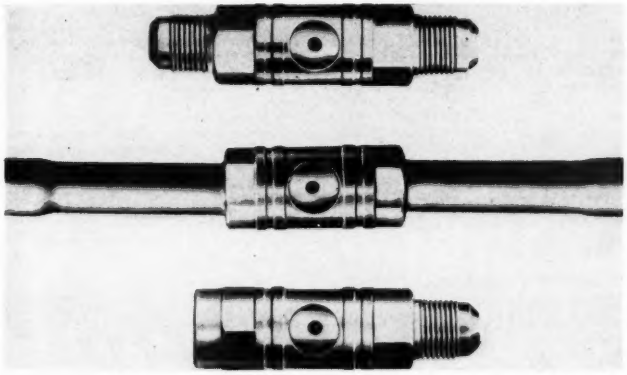
Working in close cooperation with belt manufacturer's engineers, they designed two 4-ply, 200-ft.-long by 6-in.-wide conveyor belts with the novel feature of black rubber cleats spaced alternately along the carrier-face side of the belting. Each can is continuously rocked—first one end and then the other being raised and lowered as they roll over the cleats.

In operation, hot cans are placed on the conveyor at the bottom of a rising slope and cold water is continuously directed on them. Belt speed and inclination are computed to insure 5 min. of travel on the conveyor under the cold water spray — time enough to reduce can-content temperature from 195 deg. F. to 90 deg. F.

The "Hula Cooler," as this type of conveyor is popularly known, is described as eliminating many hours of cooling storage time and accordingly permitting direct delivery from processing to labeling and shipping. Patent application for this process has been made by the Dole Co.—*Thermoid Co., Trenton, N. J.*

Circle 123A on Reader Service Card

"Eye" Indicator Gives Fast Check on Flow



A quick, positive, visual inspection of liquid flow is reported provided by placing this simple indicator in the line.

Known as the "Liquid Eye," it consists of a brass housing in which is inserted a transparent high-pressure Pyrex section with a ceramic eye that visually magnifies when liquid line is full. "Straight through" design aims to eliminate pressure drop.

Brass housing and ends are precisely machined, and glass is ground and lapped. Gasket material is termed impervious to action by liquids that are not affected by brass.

Indicator has been designed with the glass section spring mounted for shock resistance, and the method of seating the gasket prevents glass from touching housing. Assembly is completed with torque wrenches.

Available in copper tube sizes of ¼-, ⅜-, ½- and ⅝-in., indicator comes in three styles having, respectively, male flare-ends, female to male flare-ends with copper flare insert in the female end, and solder connections.—*Allin Mfg. Co., 1153 W. Grand Ave., Chicago.*

Circle 123B on Reader Service Card

What can make these good foods better?

The foods shown here, like many others, are subject to oxidation during processing. Ascorbic acid will make them better by protecting them from the loss of natural color and flavor which occurs from oxidation. Small quantities of added ascorbic acid will greatly retard this action.

And this valuable vitamin may be added to certain processed foods, such as fruit and vegetable juices, to increase their vitamin value and to allow a label claim for increased nutritional value. The cost is nominal, the processing simple.

When you use Roche ascorbic acid to keep Nature's color and flavor in the foods you process . . . when you increase the nutritive value of your processed foods . . . retail customers like them better and buy more.

We have helped many food processors to make their good foods better and we're ready to help you. Why not investigate the use of Roche ascorbic acid (vitamin C) today?

QUICK FACTS ABOUT ASCORBIC ACID (vitamin C)

as an anti-oxidant. Roche ascorbic acid protects natural color and flavor at low cost—

in frozen apples, apple sauce, apricots, sweet cherries, fruit cocktail, nectarines, peaches, pears, pineapple, fresh prunes (Italian plums), and frozen purees of peaches, bananas, apricots, nectarines and pears in fresh fruit salads in fluid, frozen and dried whole milk in frozen fillets of salmon, mackerel, rockfish, white fish, lake trout and in frozen swordfish steaks in ice cream in packaged beer in citrus oil emulsions.

to standardize ascorbic acid content or increase nutrition value. Nutritionists believe that the public interest is best served when the ascorbic acid content of the following juices is standardized. A label claim for 100% of the minimum daily adult requirement may be made when the juice contains 30 mg. of ascorbic acid. Roche ascorbic acid, pure crystals, U. S. P. quality, is available in three types: Granular, Fine Granular, and Powder for use in raising or standardizing the ascorbic content of these *processed* foods:

apple juice grape juice pineapple juice canned tomato juice (when Federal Standards of Identity permit) frozen, concentrated tomato juice vegetable juice blends cranberry juice peach and apricot nectar canned and frozen-concentrated orange juice canned grapefruit juice canned tangerine juice canned and frozen-concentrated orange-grapefruit blend.

VITAMIN DIVISION • **HOFFMANN-LA ROCHE INC.** • NUTLEY 10, N. J.

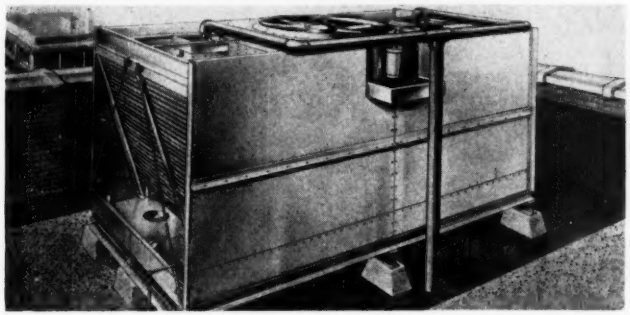
Pacific Coast: L. H. Butcher Company, Los Angeles, San Francisco, Seattle, Portland

In Canada: Hoffmann-La Roche, Ltd. • Montreal, Que.

Keeping faith with nature

ROCHE
ASCORBIC ACID

Efficiency, Simplicity Mark Cooling Tower



For use wherever intermediate capacities of cold water are required, this new cooling tower, known as the Double-Flow Aquatower, is stated to combine high efficiency with compactness and simplicity.

Outstanding features of unit:

1. It is low in height (7½-ft. for the 150-ton unit), hence detracts little from appearance of building since parapet walls usually conceal it.

2. Pumping head and required fan hp. are termed extremely low for any given capacity and design performance.

3. It is called the first cooling tower in the "medium-capacity" range to employ the patented double-flow principle—one fan utilizing air from two completely open sides.

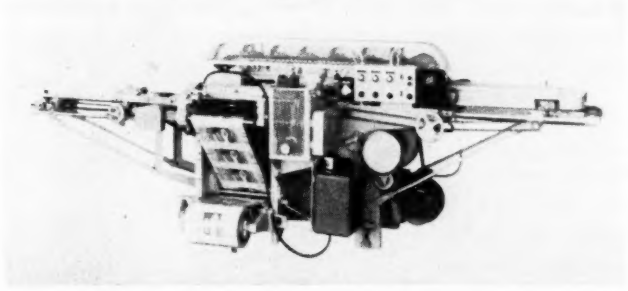
4. Tower weight is evenly distributed.

5. Design simplifies maintenance and inspection. All parts—piping, nailless red wood filling, basin fixtures, fan and motor, and distribution basin—are readily accessible.

New tower comes in seven standard sizes, starting with a 50-ton unit. It is available in all-steel, or in wood with asbestos cement board casing.—*The Marley Co., Inc., 222 Gregory Blvd., Kansas City 5, Mo.*

Circle 125A on Reader Service Card

Wraps Frozen Food Packages 150/Min.



Faster speeds along the processing line are reported possible with use of this Model 51 wrapping machine.

With no increase in floor area, and with same personnel, it reportedly wraps retail frozen food packages at speeds of 150 per minute.

Though developed for frozen foods, this unit is also stated to be adaptable to other wrapping operations. Machine is designed to create uniformly tight, pressure recessed and sealed folds in the ends of "Canco" packages, with prevention of punched or loosened end folds.

Model 51 has automatic belt intake, carton separator, and paper feed, self-clearing take-away sealing pads, and electric eye controls for registering printed designs on cartons and "Canco" packages. Safety devices are fitted to prevent damage to packages or the machine.

Operation requires only intermittent services of an attendant to change sizes or reload paper. Unit is stated to handle all latest wrapping materials, including self-sealing cellophane; printed or unprinted; laminated, waxed self-sealing papers; or heat-sealing foil. —*Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.*

Circle 125B on Reader Service Card

Versatile Impact Mill Is Mobile, Compact

Designed for wide ranges of materials and grind sizes, this compact, impact mill, called the "Pony" model, is described as pulverizing any dry, grindable material to specifications without damaging molecular structure. Powered by a 1-hp. motor, mill has a reported output of 5-100 lb. per hr.

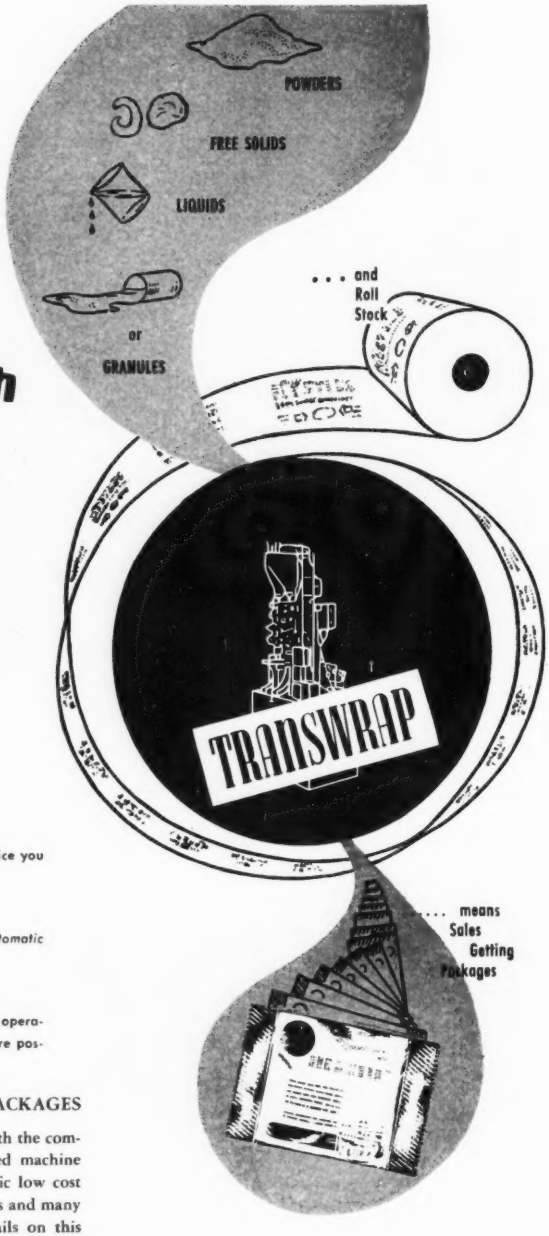
Disintegration is accomplished as particles of material strike surfaces and each other during the process. Mill speed and fineness of screen determine size of grind. Here, assembly is based on intended use. Horsepower is termed minimum in relation to production.

Other models are available in sizes ranging from 5 hp. (output 500 lb./hr.) to 30 hp. (16,000 lb./hr.). Models are either of cast or welded steel construction. The roto shaft is mounted in flange-assembled ball bearings. Special mills may be made using nonferrous metals.

Maker maintains an experimental laboratory for test-pulverizing materials of prospective mill users. Generally required are ½ to 1 cu. ft. of material for experimentation, along with a smaller sample of the finished grind.—*Mead Mill Co., 14620 E. 7 Mile Rd., Detroit 5.*

Circle 125C on Reader Service Card

in packaging. . . . . .



It CAN'T cost less than Completely Automatic

ONE STEP PACKAGING

CUTS MATERIAL COSTS—

Just compare the cost of roll stock against the price you now pay for bags. The average saving is 50%.

SAVES MANPOWER—

One operator can supervise the running of 3 automatic Transwraps.

INCREASES PRODUCTION—

This is controlled by the product and the type of operation but speeds up to 150 packages per minute are possible with Transwrap.

THE NEW MODEL "C" MAKES LARGER PACKAGES

TRANSWRAP ADDS another first to packaging with the completely new model "C". This hydraulically operated machine for packages up to 9½ x 13½, will bring automatic low cost packaging to packers of dried fruit, crackers, pretzels and many other products sold in larger quantities. Full details on this new machine are available from Transwrap. It may be the answer to better packaging for *your* product.

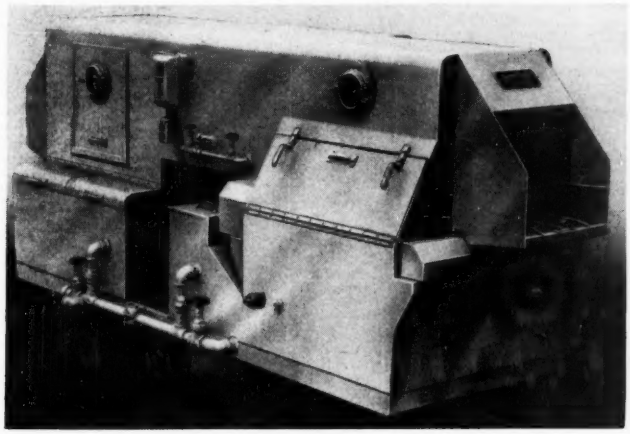
TRANSPARENT WRAP MACHINE CORPORATION

ROUTE 17 HASBROUCK HEIGHTS NEW JERSEY

"Originators of Completely Automatic Packaging"

Agents in Principal Centers of U.S., Canada, Mexico and South America

Compact, Fast-Action Case Washer



Rotary action of the wash water in this compact machine is reported to clean a case in a matter of seconds.

Two paddle-wheel rotors are employed instead of a pump spray in the washing cycle. Use of centrifugal rotors is stated to increase machine efficiency by eliminating lost time in maintenance of clogged spray pipes and pumps.

In operation, the tips of the two rotor paddles are immersed in wash water. Rotating in opposite directions, the paddles developed a top speed of 24 fps., picking up and whirling the wash water around the case. The clockwise-turning rotor cataracts water over the top of case while the counter-clockwise rotor directs water to the under side.

An automatic level control is used in the wash tank to replenish water lost by carry-over of cases. Water consumption is termed small, with water replaced by condensation.

Water temperature is kept even by a steam ejector, which has a built-in thermostat.

Washer is furnished complete with valve and strainer and need only be connected to steam line to operate. The thermometer is installed in tank alongside of injector for temperature indication.

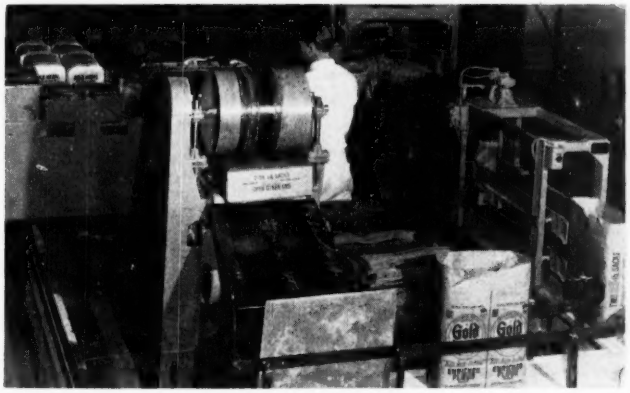
Trays for collection of refuse (such as broken glass, bottle caps, etc.) are installed at water level between rotors. Large particles are prevented from settling to bottom of the tank by the trays, which are easily removable for cleaning. Dirt passing through strainers settles at the bottom of tank and can be drained into sewer.

Portlights are installed on both sides of the chamber for watching the wash cycle. A large door is provided at front for easy access to rotors and trays.

Suction and discharge flanges of pump are specially cast to permit mounting pump directly to machine without use of protruding piping. Pump is coupled to same motor used for driving rotors, making a compact installation.—*Cesco Container Co., 475 Fifth Ave., New York 17.*

Circle 127A on Reader Service Card

Automatically Bales Consumer-Size Flour Bags



Filled consumer-size flour bags are automatically inserted into paper baler bags by this new machine.

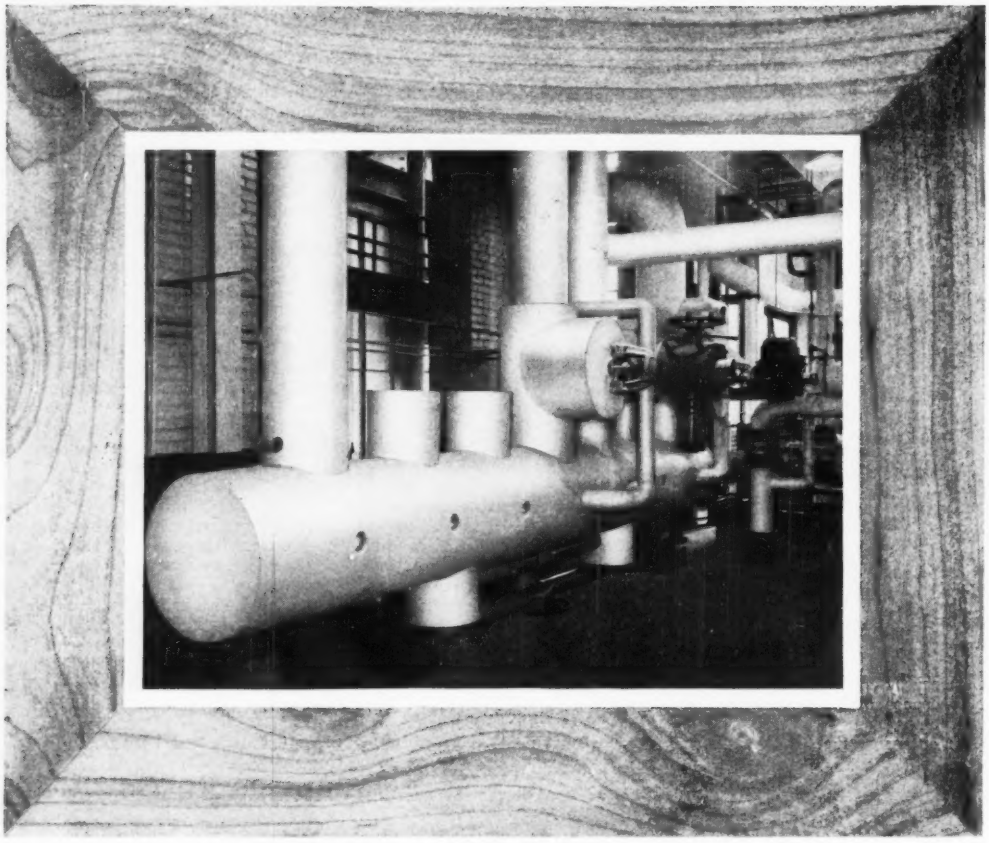
Designated as the 225-B, baler is a pneumatically powered unit reported capable of compressing and inserting two 25-lb. bags of flour into a 50-lb. baler bag at the rate of 20 a minute. The tight, relatively square bales are described as having excellent stacking and handling properties.

A pilot model of the 225-B is currently in use at the General Mills plant in Buffalo.

Baler is designed for use in a production line in conjunction with the 100-BCS bale closing and sealing unit. The two can be so positioned that only one operator is required to attend both machines.

In operation, two lines of filled bags are directed into the baler by a continuously running conveyor belt. As the two lead bags arrive in position, there is set in motion an air cylinder and pusher combination that moves the bags out of line against a stop plate, then in a continuing forward motion compresses the bags to slightly less than the width of the baler bag. A second air cylinder and pusher then forces the bags through a set of opening jaws on which are clamped the top edges of the baler bag.

At the end of this thrust, the two bags are firmly seated at the bottom of the baler bag, which is then released from the bag opening jaws and conveyed automatically to a roll that compresses the face of the bale. Another conveyor leads the filled bales to



Insulation Contractor: Guy M. Beaty & Co., Charlotte, N.C.

Steam header at Cannon Mills Co., Kannapolis, N.C., insulated with K&M Hy-Temp and "Featherweight" 85% Magnesia Combination, finished with sewed canvas jacket.

PORTRAIT OF STEAM HEADER AT 750° F.

clothed for life . . . . with K&M Insulations

YOU SEE here one of the most efficient combinations you can get today for lifetime protection against heat loss—K&M Hy-Temp Insulation teamed up with "Featherweight" 85% Magnesia.

You can use the same combination, in appropriate thicknesses, for efficient insulation of temperatures from 600° F. up to 1900° F.

K&M Hy-Temp Insulation is applied directly to the high temperature surface in sufficient thickness to lower the temperature of the outer surface of the insulation to 600° F. or less. "Featherweight" 85% Magnesia, which has a higher insulating value, is then applied directly over the Hy-Temp Insulation, thus utilizing the advantages of both insulations to the fullest extent.

These insulations are supplied in appropriate forms and thicknesses for application to equipment surfaces and piping.

Your local K&M distributor, who is an experienced applicator, will give you full information. Or write us direct . . . we'll rush a reply.

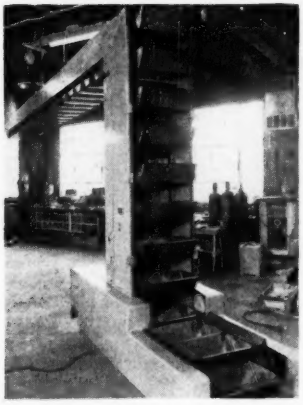
Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

the closing and sealing machine. Both air cylinders return to their starting position automatically and repeat the baling cycle.—*St. Regis Paper Co., 230 Park Ave., New York City 17.*

Circle 127B on Reader Service Card

Many Products Handled By "No-Scoop" Elevator



The scooping action is eliminated in this new Robo-Lift bucket elevator, purpose being to handle a wider variety of products.

As illustrated, a short horizontal run is provided, allowing the trailing edge of each bucket to overlap the leading edge of the one following. This presents a series of pockets into which material can be fed continuously without spilling.

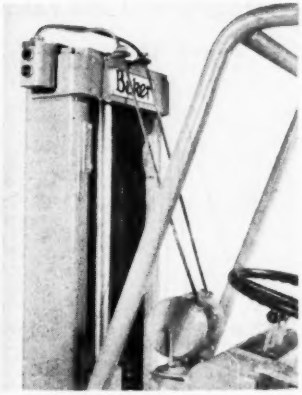
Since the material is fed *into* the buckets and not scooped, damage to product is minimized. Standard supply hopper and vibratory feeder are recommended when a controlled flow to the unit is not available. A slide gate in hopper can be adjusted to regulate flow to feeder.

In discharging, buckets are inverted completely by stationary tippers. Delivery chute mounts directly under discharge point, minimizing drop. Angle of chute can be varied to suit requirements, and discharge can be to right or left. Free-flowing fragile products are handled by addition of a diverter chute that allows product to slide from buckets without drop.

Stainless steel supply hopper, vibratory feed chute, buckets, and delivery chute provide maximum sanitation and ease of cleaning.—*Counsel Machine Co., 8 Hathaway St., Wallington, N. J.*

Circle 129A on Reader Service Card

Remote Control Unit Raises, Lowers Forks



Lift truck operators can now leave their wheels and ride their own forks "like an elevator." This is accomplished with a new remote-control attachment.

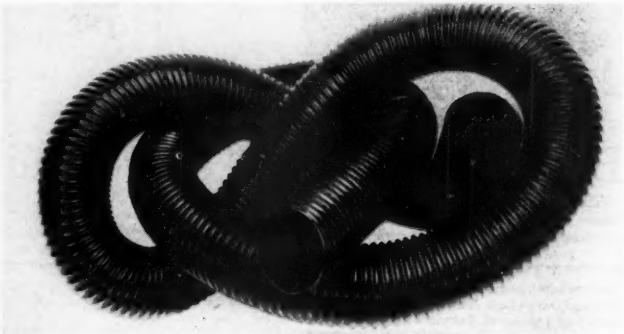
The new unit was originally developed for a company that wanted a handy way to get at infrequently used stock stored in hard-to-reach bins. Truck operators in this plant use guard-railed pallets as work platforms, to raise them to the stock they want.

Lifting and lowering is controlled by a small control unit (left photo) which is picked up and held by the operator (see right photo). During normal truck operation, the unit clamps over the tie bar on the truck's inner upright (as shown in the first picture).

Cable for unit is housed in reels, under tension, so that it won't kink. Reels contain enough cable to allow unit to be taken to truck's standard lift limit. Maker states any fork-truck model can be fitted with new attachment.—*Baker Industrial Truck Div., The Baker-Raulang Co., 1250 W. 80th St., Cleveland 2.*

Circle 129B on Reader Service Card

Neoprene-Nylon Hose Is Highly Flexible



THIS lightweight hose, made of Neoprene compounds and laminated Nylon chafer duck, is noted for its flexibility. It was designed for operations involving dust collection and handling of feeds in pressure and vacuum services. Sizes range from 1½ to 24 in. I.D. Availability: Two to four weeks.—*American Ventilating Hose Co., 100 Park Ave., New York City 17.*

Circle 129C on Reader Service Card

A Star Quartet of Economical, Sales-Building Packages

for Your Products

Bemis Deltaseal®

—This long-time favorite has exclusive pull-cut-pour spout. Billboards your brand . . . and flat tops and bottoms help build excellent mass displays.

Bemis Deltaphane®

—If your trade prefers a window package, Bemis Deltaphane, with the "picture window," is your best bet. Your brand in crisp, bright colors on all four sides. Has the pull-cut-pour top, too.

Bemis Cellophane

—There's an increasing demand for the *show window* bags — Bemis Cellophane. Bemis' bright, eye-catching printing makes your brand shine like a headlight.

Bemis Flexi-Carton®

—Sturdy, gusseted bag, single-, 2- or 3-ply. A fine shelf package, with your brand printed on all sides. Closures: sewing, taping, stapling, pasting.

Here's another bonus for you . . . Bemis Deltaseal Packaging System *closes all of these types* of bags (except Flexi-Carton), so you can meet the varied demands of your trade. Deltaseal Packaging System is the most economical packaging operation for you . . . *proof on request.*

Bemis is also your best source for Burlap, Cotton, Multiwall, Paper and Waterproof Bags. Ask your Bemis Man for the complete story.

Bemis

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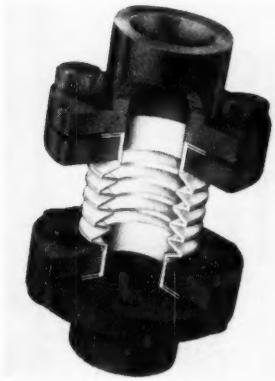
Versatile Bellows Connector For Corrosive Materials



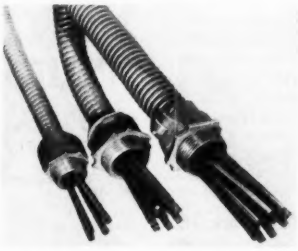
Fabricated of chemically inert Teflon, this new bellows-type connector is seen having many pipe-line applications where vibration, expansion, and electrolysis are encountered in the handling of corrosive liquids, gases, and solvents.

New connector is described as electrically non-conductive, flexible at minus 94 deg. F., and as strong at 480 deg. F. as at 70 deg. F.

Bellows connector serves as a vibration dampener as well as an expansion joint. It will readily connect misaligned couplings. Joint's end flanges are French-type envelope gaskets designed for easy assembly between companion flanges and a tight, leak-proof seal on installation.—*Crane Packing Co., 1800 Cuyler Ave., Chicago.*

Circle 131A on Reader Service Card

Air, Hydro Circuits In Compact Cable



Pneumatic and hydraulic control circuits may now be streamlined through the use of Armortube cable, a flexible, protected multi-tube transmission line.

Unique cable is made up of ¼-in. O.D. aluminum or copper tubing gathered in a slow continuous spiral similar to the construction of rope. A tube bundle is first wrapped in water-repellent insulating tape, then it is encased in a heavy rust-resistant, galvanized steel casing like that used for BX electrical cable.

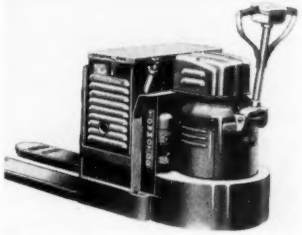
Cable has been designed to: (1) Cut installation time and costs; (2) save critical materials; (3) protect instrument and control connecting lines; (4) conserve space; and (5) improve plant appearance.

Available in bundles of 4, 8, and 12 tubes, cable is capable of transmitting hydraulic control pressures as high as 3,000 psig. and all ranges of pneumatic control pressures. Connections and take-offs may be made in standard electrical junction boxes.

Standard pipe or conduit clips may be used to fasten cable to walls or ceilings. A tracer tube easily identifies corresponding tube ends between cable connecting points, since all tubes in a bundle maintain the same position relationship.—*Bailey Meter Co., 1022 Ivanhoe Road, Cleveland 10.*

Circle 131B on Reader Service Card

Electric Pallet Truck Has Own Generator



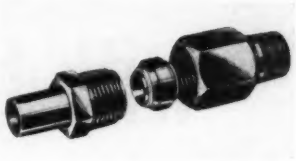
A built-in generator is a feature of this electric pallet truck, eliminating the need for conventional storage batteries and re-charging. Further, it provides constant available power for round-the-clock operation.

New unit, designated as "Model W with Ready-Power", is an adaptation of standard electric pallet truck, with a small, gasoline-powered generator supplying constant, maximum voltage for operation. Ready-power mechanism is mounted in the standard battery compartment, with gasoline engine, fuel tank, starting battery, and all accessories, completely enclosed in sturdy steel housing.

To run, operator simply turns ignition key and presses starter button—both conveniently located—and current is generated immediately, with power provided to move up to 4,000 lb.—*Towmotor Corp., Cleveland.*

Circle 131C on Reader Service Card

Stainless Tube Fittings Are Self-Centering



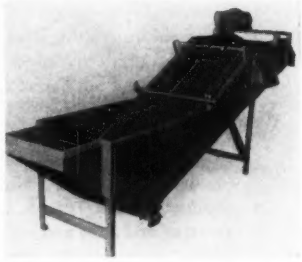
Recently announced is a new line of corrosion resistant stainless steel fittings, for Schedule 5 S and 10 S tubing.

Included is a standard selection of elbows, tees, unions, and connectors for sizes up to and including ¾-in., with couplings for larger diameters handled on special order. New line incorporates patented, self-centering seat stated to insure a leak-proof, wedge-type seal, even though tube is assembled off center.

Another feature is reinforcing Teflon rings for double-sealing the seat to further guard against gas or liquid losses.—*The Special Screw Products Co., 5445 Dunham Rd., Bedford, Ohio.*

Circle 131D on Reader Service Card

This Soaker-Washer-Sorter Cuts Tomato Handling



Most of the hand sorting now required in washing and grading tomatoes is reported eliminated by this combination soak tank, spray washer, and grader.

In operation, only the larger, more nearly perfect, tomatoes suitable for peeling and whole can-packing pass over the conveyor and into the scalder thereby eliminating the old hand sorting. Added to this saving is the im-

"Cuts pressing time 1/3 with help of CELITE"

A report on prune pressing by a Celite Field Engineer

"BEFORE USING CELITE* Pressing Aids, one of my customers was getting only two batches of prune juice per day from the presses. When he started mixing a small percentage of Celite with the cooked fruit, the saving in pressing time was apparent at once. Now he gets three batches per day.

"In addition, the juice is much clearer and cloth breakage is reduced to the point where this alone represents a big saving."

. . .

This user's experience is typical of that in many plants where Celite Pressing Aids are used. Faster production, clearer juice, higher yields, less wear and tear on cloths and equipment are some of the important benefits obtained when these diatomite powders are added in small amounts to the pulp before pressing.

HOW CELITE PRESSING AIDS WORK:

The tiny Celite particles, open and porous in structure, interpose themselves between the particles of solid pulp matter. This opens up countless minute channels through which the juice can escape, freely and at lower pressure. More juice is thus extracted in less time. The drier cake is more easily removed and the cloths can often be reused without washing.

Celite Pressing Aids are used with practically all types of fruit products. No special equipment is needed and the benefits they assure will usually more than pay for the small amounts of powder required.

If You Filter:

Celite Filter Aids can bring you corresponding benefits in faster production, sparklingly clear juices, longer filtration cycles. They are available in 9 grades of particle fineness, each designed for a specific filtering requirement. A Celite Engineer will be glad to give you all the facts.

*Reg. U. S. Pat. Off.

For further information, write Johns-Manville, Box 290, New York 16, N. Y.

Johns-Manville CELITE
PRESSING AIDS

proved soaking and washing treatment that provides a cleaner product.

Conveyor in unit is of roll, chain, and rod construction. Spacing between rods is 2⅜ in. Rods carry tomatoes out of soak section, beneath a series of water sprays for dirt removal. At top elevated level section, under-sized tomatoes (those smaller than 2⅜ in.) are dropped out via a slide chute. Caught on the trimming conveyor, these smaller tomatoes are used for juice, pulp, catsup, or other products.—*Berlin Chapman Co., Berlin, Wis.*

Circle 131E on Reader Service Card

New Chemicals

Dough-Conditioning Agent Improves Baked Goods

Keeping quality, customer appeal of bakery products, and savings are reported with use of an entirely new dough conditioner.

Called Glorize, the product is a specially processed high-protein corn flour. It is termed easy to add to baker's present formulas.

Put into wheat flour, it reportedly mellows the characteristic strong fibers of the wheat, resulting in better sheeting, machining, and flow of dough or batter. Make-up of Danish, coffee cake, and coffee rings is stated to be improved since dough will stretch easily and stay in shape without shrinking. In layer cake, loaf cake, pound cake and cookies it is said to produce a firmer and shorter texture with better eye appeal.

New conditioner contains approximately 50 percent protein. Maker describes it as giving a dry, soft feel to the dough, adding that it permits reduction of dusting flour.—*Baking Products Sales Corp., 420 Lexington Ave., New York 17.*

Circle 133A on Reader Service Card

Soluble Cleaner Gives Film-Free Surfaces

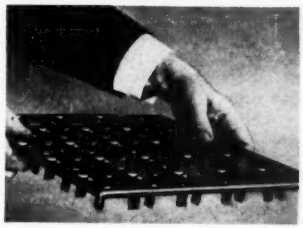
Sparkling clean, film-free equipment surfaces are reported obtained with use of Ditran, a new general cleansing compound. It is termed easy to use and store.

New product is stated to go into solution instantly, and soften the water, producing suds that cut the grease film, then drain and rinse freely to leave a bright, clean surface.

Compound is non-dusting and is said to be easy on hands and equipment.—*The Diversey Corp., 1820 Roscoe St., Chicago 13.*

Circle 133B on Reader Service Card

Steel Floor Plates For Heavy Traffic



This 11¾-in. sq. plate of .068-in. hot-rolled steel is designed for the reinforcement and protection of concrete floor surfaces subjected to heavy industrial loads.

Plate can be quickly installed on a new surface or over old floors, says maker, with no special tools necessary for installation. Each plate contains 100 small rectangular holes, approximately ¼ x ¾ in., and 100 barbed prongs ¾ in. long. These prongs anchor plate to concrete. Four rounded edges of each plate form a flange that becomes imbedded in concrete and adds rigidity.

Area-wise, surface of a concrete floor reinforced with this plate is 74 percent steel and 26 percent concrete.

For new floors: After a dry concrete topping mix is poured over base slab and screeded, plates are pressed into topping until pillows of concrete extrude upward through holes. Plates are then leveled with floor surfaces and each other with 2 x 4 lumber.

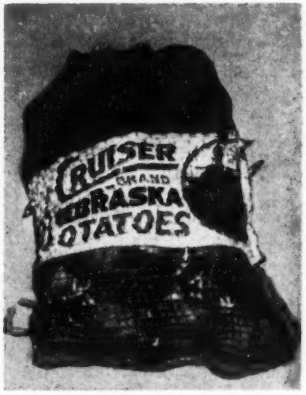
Over old concrete floors: Here, surface must first be chipped to a depth of approximately 2 in. and a slush bond coat brushed into chipped surface before topping mix is poured. After this, procedure is same as that for new floors.

Plates are packaged in cartons of 20. Shipping weight is approximately 65 lb.—*Acme Steel Co., 2840 Archer Ave., Chicago 8.*

Circle 133C on Reader Service Card

Material Inhibits Potato Sprouting

Untreated



Treated

After lengthy field testing, a new material has been released for curbing the sprouting of Irish potatoes. Three-month inhibition is reported, with the tubers kept fresh, firm, and edible.

Known as "Sprout-Inhibitor Colorfresh," the product is put on the surface of the potato in a thin wax film that holds the active ingredient in contact with the lenticel or "eye" of the spud. Application is with a foaming apparatus, employed when the potatoes are removed from storage following their normal dormancy period and after they have been thoroughly washed.

Maker states that in addition to retarding sprouting, the coating helps retain the natural appearance of the potato.—*Johnson Wax Co., Racine, Wis.*

Circle 133D on Reader Service Card

EDITORIAL
FRANK K. LAWLER,
Editor

In Behalf of Progress . . .

Automatic Control Challenges Industry

No phase of food engineering is developing faster than process instrumentation. It is advancing so rapidly that management, engineers and technologists are behind the parade in their knowledge of what it will do and in their appreciation of its significance.

Technologists heretofore have been jumps ahead of plant operating technics. They have known more about proper process factors and conditions than anyone has been able to put to precise work in commercial plant operations.

But the worm has turned, and technical men face a challenge. We now see variables in complex, sensitive continuous processes being controlled with a degree of pinpoint accuracy that warms the cockles of the technologist's heart. You will see what we mean if you read the article, "Instruments Catalyze Progress," on page 76 of this issue.

A long time coming in many branches of the industry, advanced automatic control is making its significance felt in the field. Not only is it causing old processes to be re-engineered for better performance, but it is catalyzing new and revolutionary processes.

It may be truly said that instruments are a keystone of progress. As has long been true in the chemical industry, advanced food processes almost literally are being "hung" on automatic controls. Short-time high-temperature processing and aseptic canning are familiar examples.

This represents quite a change in the past 20 years. In the early thirties, we saw instruments disconnected from the processes. It seemed that food processing was considered an "art," and that no controller could take the place of the skill in the hand that turned the valve.

Perhaps formula development is an art. But not so with the control of variables involved in processing the formulated product for optimum quality, capacity, and yield. Such control is a physical operation. On the production line, "art" departs from the scene and engineering takes over.

Instrumentation presents a double-barreled challenge to management and production supervisors. Not only will it help them materially in attaining and maintaining the quality inherent in the raw material and the formula, but it will enable them to cut costs and reduce losses.

Let's take a few examples to prove the point:

Just to be on the safe side, a 1,200-gal. an hour citrus concentrate plant was giving away extra fill in every can. It was keeping product density on the plus side by about 0.5 deg. Brix. Then it got wise and installed automatic density control on the evaporators. The savings amounted to $300 a day in product and the cost of two men on a blending station.

By automatically controlling the end-point temperature of the cook, a ten-kettle preserver saved $200 a day in over-rich product. When the temperature went as little as 0.4 deg. too high with manual operation, the solids content was 66 percent instead of 65, and the loss per day per kettle amounted to at least $23. Automatic control holds end-point within 0.1 deg. It cost about $500 a kettle but paid for itself in a month.

Still another end-point control installation—this one on lard-rendering—cut average cook time by 24 percent and upped yield. And similar control on tallow rendering put the product into the premium grade, netting an additional $15,000 in a year—a mere 15 times the cost of the controls.

By virtue of close quality regulation, instrumentation also can avoid court costs, losses from condemnation of product, and the immeasurable set-back that comes from consumer displeasure at off-quality. There is the case of the mushroom canner who was out several thousand dollars in court costs after being hauled onto the carpet for low drained weight. Retort controls could have spared him this embarrassment and expense. The cans were properly filled, but overcooking took excess moisture from the mushrooms and added it to the water in the cans.

Sometimes a new temperature-measuring application can bring big results. It has for some processors who store grains and have to turn the contents of each bin at intervals to prevent insect damage. This costs an estimated $10 per 5,000-bu. bin per turning. And if the grain is not turned when necessary, the loss can run as high as $2,000 per bin. But a special stored-grain temperature indicator eliminates unnecessary turnings and avoids loss through failure to turn the material soon enough.

Critical processing problems often are solved by instruments—for quality gain and greater sales. Among them are obtaining proper gloss in gum candies, brittleness in peanut brittle, color in lard and corn flakes, and texture and color of baked products.

And salaries of manual operators are saved by controls in a wide range of operations, including roasting, tempering, smoking, retorting, drying, mashing, and fermenting.

Yes, advanced instrumentation clearly presents a challenge to management, engineers, and technologists. It dares them to put into commercial practice the know-how of the laboratory.

Remember—control instruments can take over where laboratory instruments stop.

Let J & L Steel Drums and Pails

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J&L STEEL

Representative samples of J&L's complete line of steel shipping pails showing (top to bottom) the ring seal, closed head and lug covers.

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Chrysler Building
New York 17, N.Y.

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Company_____

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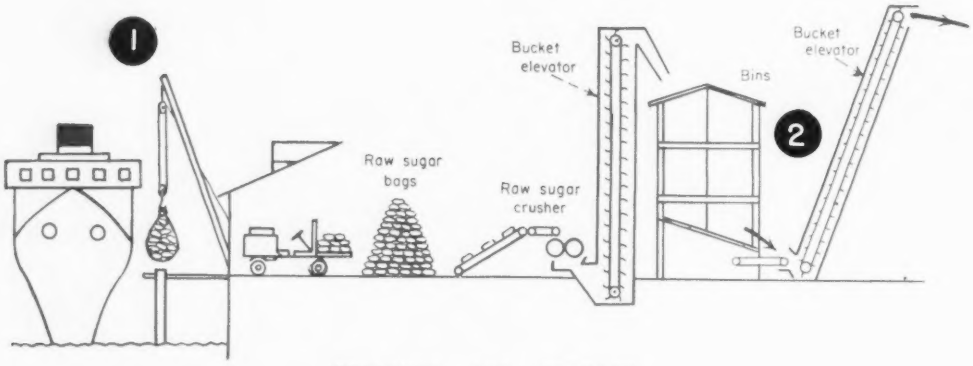
TURN PAGE FOR FOLDOUT FLOWSHEET →

1 **BAGS** of raw sugar are unloaded into plant.

2 **FROM** bulk-storage bins, raw sugar is conveyed to mingler.

3 **IN MINGLER,** raw sugar is treated with affination syrup.



RECEIVING AND STORAGE

Refining Quality Liquid Sugars

Making of Sucrose and Invert Syrups is Controlled in Mechanized Process

THROUGH advanced, automatic processing technics, production of liquid sugars termed "as close to 100 percent purity as commercially possible" is achieved at Refined Syrups & Sugars, Inc., Yonkers, N. Y. refinery.

Incoming raw sugar—start at Point (1) in diagram—is fed into the mingler, where it is mixed with affination syrup. The resulting magma is then centrifuged, and the washed sugar goes to melters and defecating tanks. Here, lime and phosphoric acid solutions are added to form a floc. Clarification in Jacobs units follows.

Top-Technic Operation and Control

—are the factors activating the production lines shown here. How they have been pioneered is told in this month's feature article, "Advanced Technics Set Pace in Making Liquid Sugars"—on page 67.

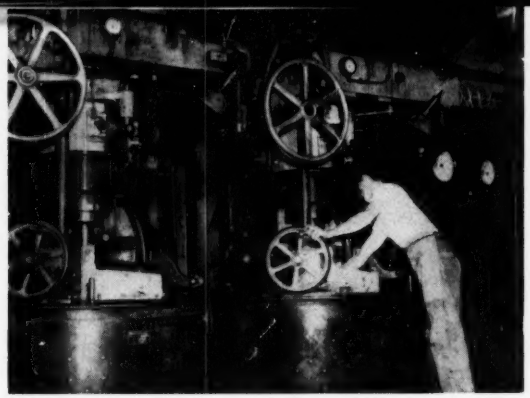
Syrup is now decolorized in bone-char beds—the darker liquid being refined into granulated sugar, the lighter into liquid sugar.

The latter is treated with activated carbon and filtered. Process splits into production of sucrose and invert syrup.

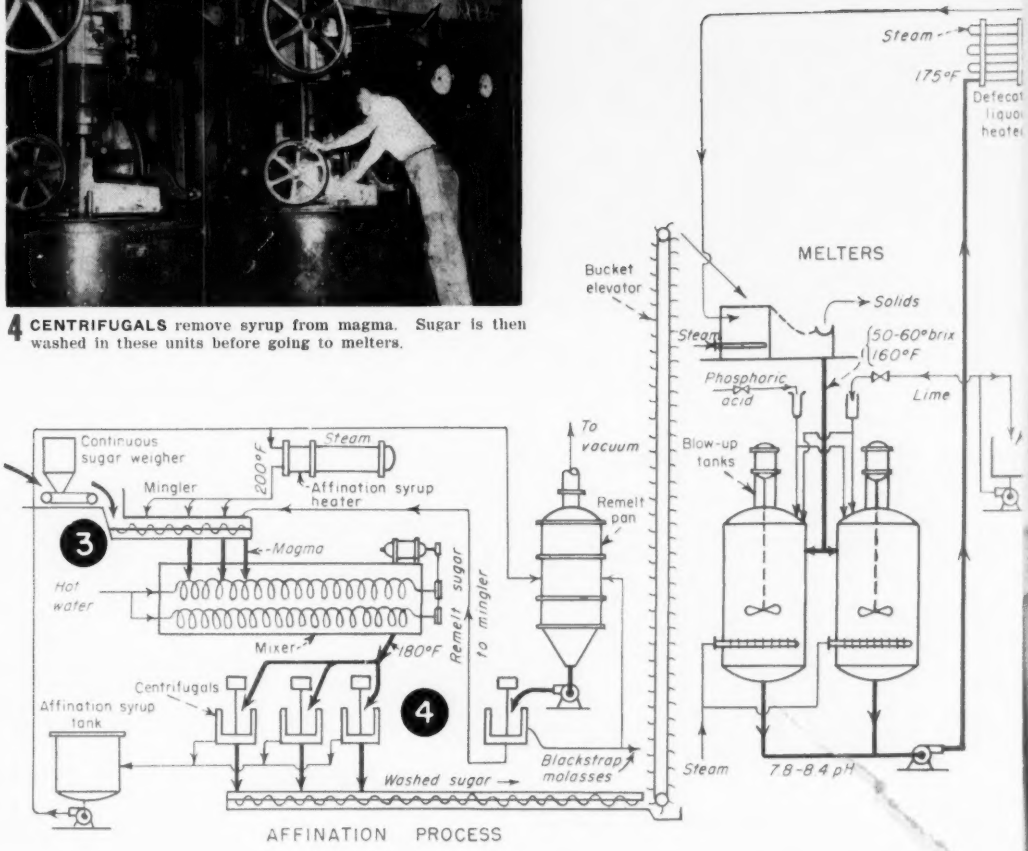
Refining of sucrose syrup proceeds in this manner: Liquor is concentrated to 67 Brix in single-effect evaporators, cooled to 100 deg. F. in a heat-exchanger, polished in pressure-leaf type filters, and pumped into storage tanks.

Now to refining invert syrup: Activated carbon treated liquor is pumped through a heat-exchanger, where its temperature is lowered to 120 F. Treatment in the ion-exchange system follows. Here, inversion takes place and most of the remaining ash is removed as the liquor passes through a series of cation and anion beds.

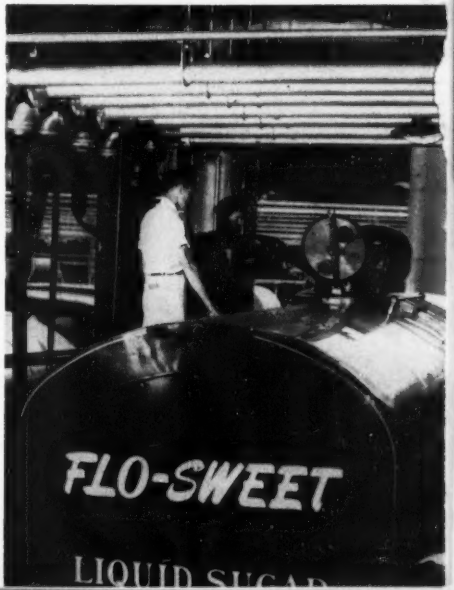
Subsequent refining processes are the same as those involved in the manufacture of sucrose syrup—concentrating, cooling, filtering, and storing. Only difference is that this syrup is concentrated to 76-Brix.



4 **CENTRIFUGALS** remove syrup from magma. Sugar is then washed in these units before going to melters.



5 **LIQUID SUGAR** is gravity-fed from storage into tan pumped into users' storage tanks.



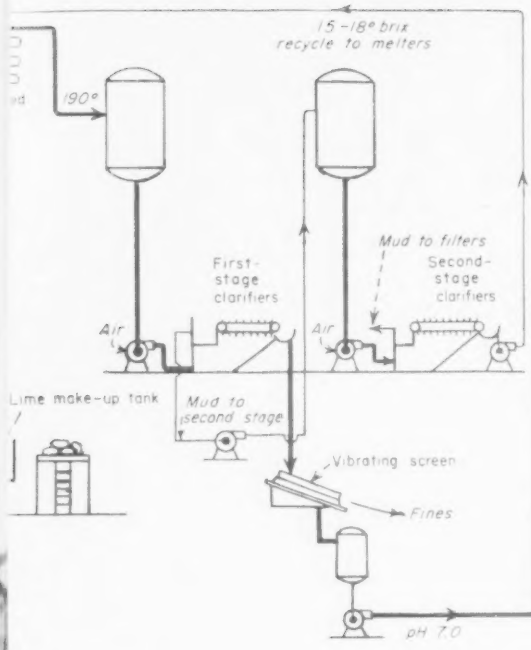
LIST OF EQUIPMENT

General Processing Units

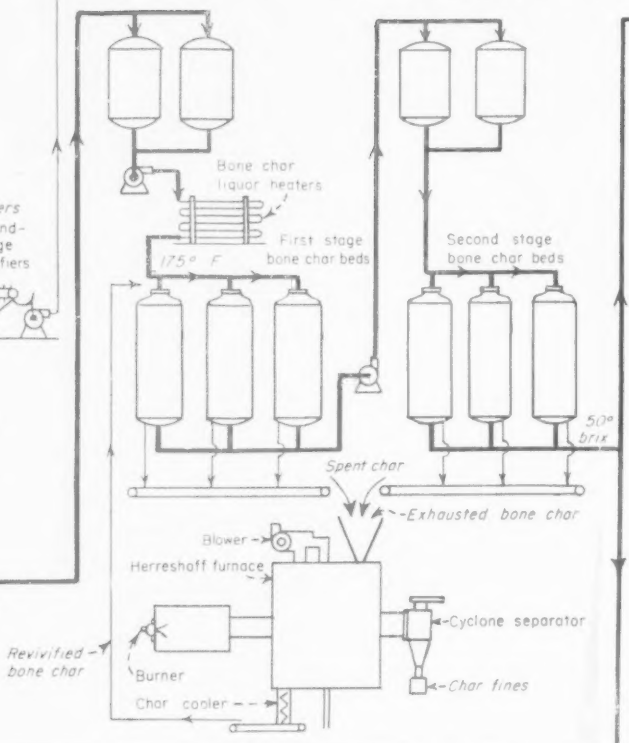
Raw sugar crushers—Stephens-Adamson
Tubular heaters, melters (Refined Syrups & Sugars design), and pressure, rotary-leaf type auto-filters—Turi Iron Works, Inc.
Evaporators, vacuum pans, and calandrias—Porto Rico Iron Works; Sucesores de Abarca; and American Locomotive
Mingler, with Roberts-design hot water coil; Stevens-design mixers; and Roberts-design centrifugals—Western States Machine Co.
Jacobs-type clarifiers—Nadler Foundry & Machine Co.
Remelt centrifugals—S. S. Hepworth
Herreshoff furnaces—Nichols Engineering Co.
Plate-and-frame filter presses—Shriver
Stainless steel polishing filters—Niagara; Hercules; and Enzinger
"Helioflow" heat exchangers—Graham Manufacturing
"G-fin" coolers—Griscom-Russell
Vibrating wet screens, with Tyler screen cloth—Niagara
Ion exchange units and evaporating catch-alls (both of Refined Syrups & Sugars design)—Crown Tank Co.
Granulators—General American Transportation
"Aerofin" steam space heaters for granulators—American Blower
Wet spray type dust collectors for granulators—Buffalo Forge
"Rotex" dry sugar screens—Simpson
Bagging equipment—Consolidated Packaging Machinery

Auxiliary Processing Units

Blowers for storage-tank ventilation—Buffalo Forge
Conveyors—Link Belt; Sauerman
Tractors—Autocar
Trailers—Heil
"Mobilift" stacking trucks—Vaughan Motors
Hoists—Lidgerwood Manufacturing



DEFECATION AND CLARIFICATION



CHAR AND CARBON TREATME

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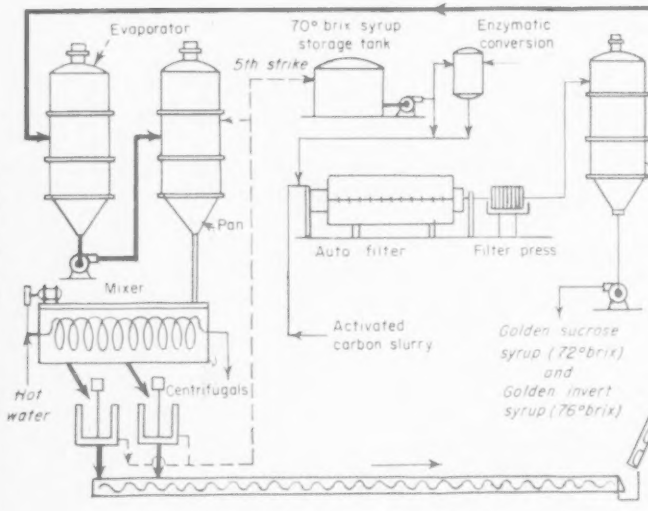
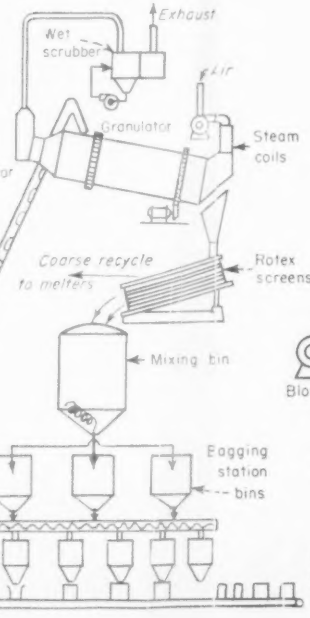




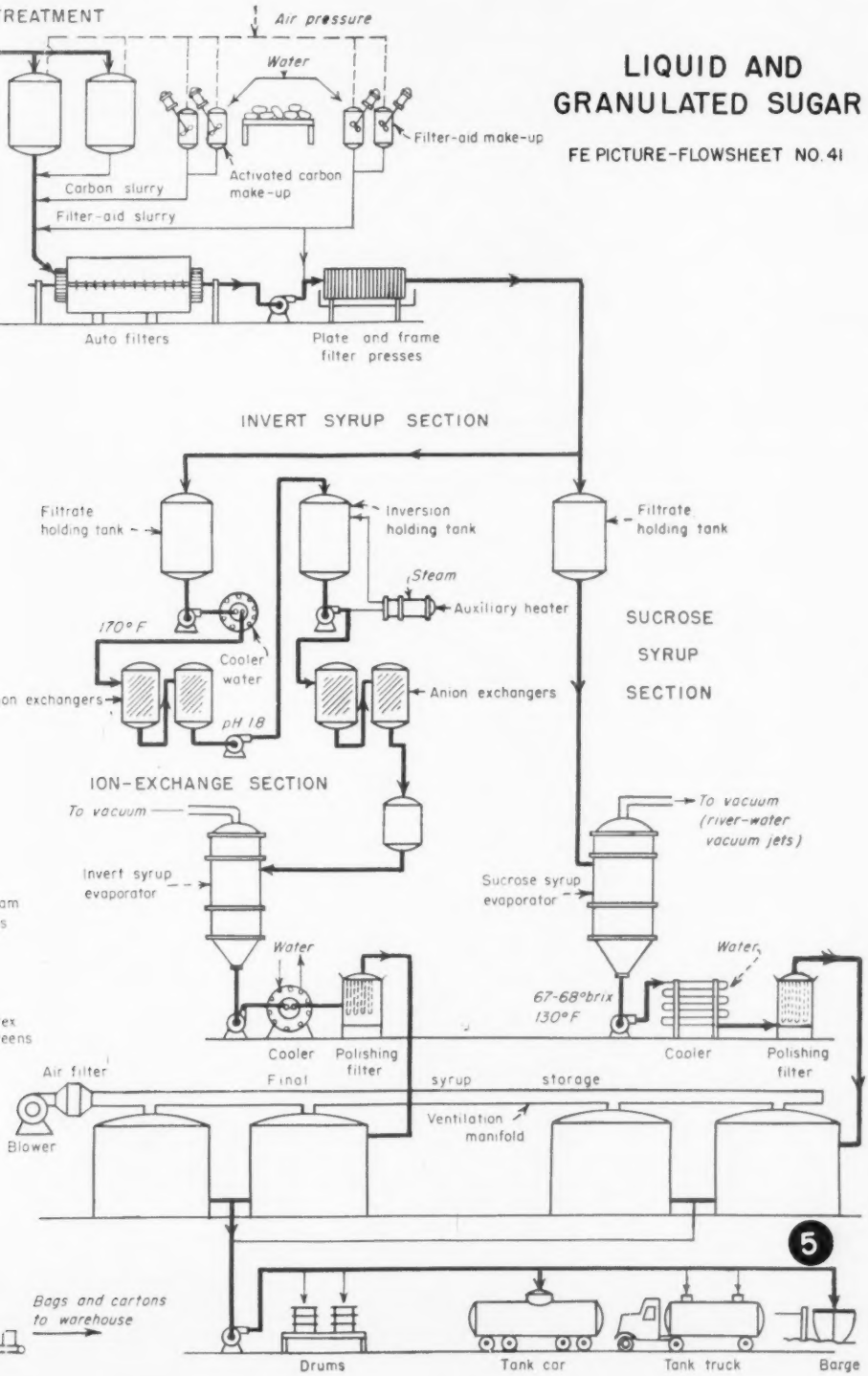
GRANULATED SUGAR SECTION

Bags
to war

k trucks, later

LIQUID AND GRANULATED SUGAR

FE PICTURE-FLOWSHEET NO. 41



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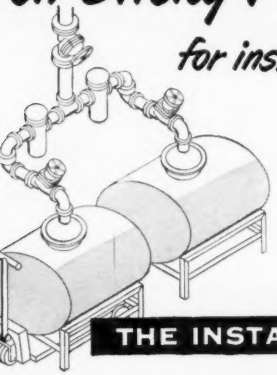
VALVES •

Do Your Valves Fit Your Job This Well?

on Sticky Fluid

for instance



THE INSTALLATION

Diaphragm Valves on air pressurized liquid piping service in paint factory, Adams & Elting on, The Glidden Company, Chicago.

THE HISTORY

ntional valves formerly used in this service hindered by exposure of working parts to the uid. The sticky latex would accumulate in the t and stem threads, freezing the stem, and mak- lve operation difficult or impossible. With 10 re operating cycles required daily, the plant considerable valve trouble and maintenance se.

n trouble and maintenance cost were com- eliminated by replacing with Crane Dia- m Valves. Their fully sealed bonnet keeps the ut of working parts. They operate smoothly o not freeze or stick. So well is the customer d with Crane Diaphragm Valves, more have rdered for new latex lines.

VALVE SERVICE RATINGS

OPERATION:	Easy - No sticking
SUITABILITY:	Fluid can't get into bonnet
MAINTENANCE COST:	None to date - None indicated
SERVICE LIFE:	No sign of wear
OPERATING RESULTS:	Production delays stopped
PRICE:	In line - No premium
AVAILABILITY:	Stock item in Crane line

THE VALVE

Crane No. 1610 Iron Body Packless Diaphragm Valves featuring separate disc and diaphragm. Neoprene diaphragm acts as bonnet seal only; isn't pinched or stressed when valve is closed. Conventional type seating makes positive closure even should diaphragm fail. High flow capacity Y-pattern body has non-restricting interior design. Available unlined or fully Neoprene lined. Consult your Crane Catalog or Crane Representative.

mplete Crane Line Meets All Valve Needs. That's Why
More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

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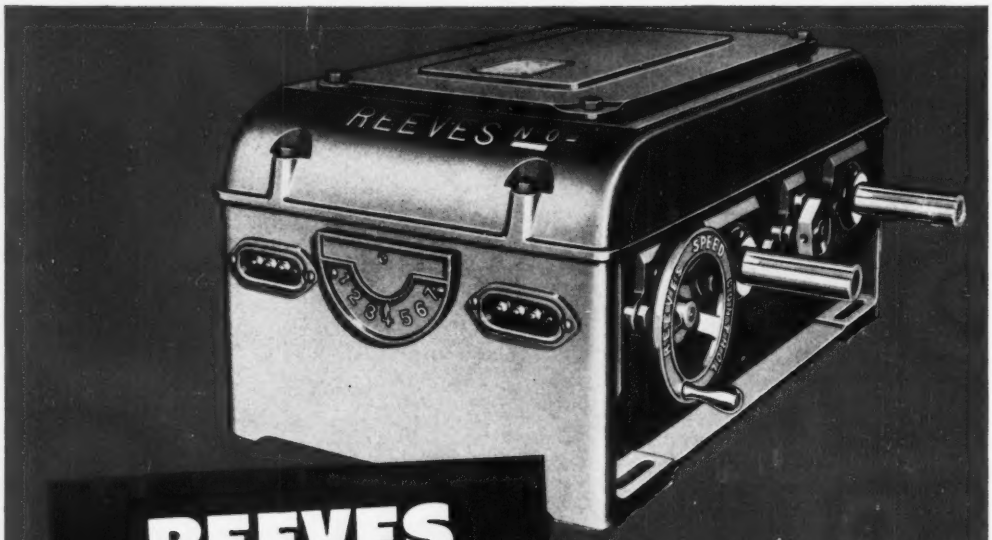
For more information, use post card on last page.



REEVES Variable Speed Transmission

The *original*, mechanically correct unit for providing complete, stepless speed adjustability.

Industry's most widely used unit for adjusting machine speeds . . . for all these good reasons:

1. Incorporates the REEVES operating principle—proved in 300,000 installations—which assures *accurate, positive* delivery of any desired speed within the entire speed range, without stopping the machine.

2. Makes "changeovers" easier—utilizes the machine's *full* capacity—by providing the *right* speed—with the turn of handwheel or touch of button—for every operation and every operator, under every changing condition.

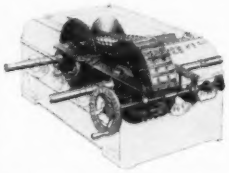
3. Wide choice of vertical and horizontal models—capacities up to 87 hp; in speed ratios of 2:1 to 16:1; manual, electric, hydraulic or completely automatic controls; suitable for mounting in any position. Also "Internals" for mounting within machine framework.

4. Easily installed on your machines. Ruggedly constructed with few moving parts subject to wear . . . requires no special tools or training to maintain.

5. Used on more different kinds of machines in a greater variety of industries than any other single variable speed drive.

Profit from REEVES Speed Control in your plant—*see immediate results.* Send for full details on REEVES Speed Control—ask for catalog No. FE68a-G.

Operating Principle



REEVES Variable Speed Transmission embodies the proved operating principle of a V-belt driving between two pairs of cone-shaped discs, mounted on parallel shafts and adjustable to form an infinite number of driving and driven diameters. One shaft receives power at constant speed from motor, line shaft, etc. Other shaft delivers power at infinitely variable speeds to driven machine. Each speed setting is held without fluctuation. Operation is practically noiseless.

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Recognized leader in the specialized field of speed control engineering

accurate · variable **REEVES** *Speed Control*

Some Things Are WORSE THAN STRIKES

This editorial which appears in McGraw-Hill publications was written just prior to the resignation of Charles E. Wilson as Director of Mobilization. The principle it discusses is of basic and continuing importance in our struggle to maintain economic and personal freedom in America.

It is to be hoped that the managements of the steel industry will resolutely resist the efforts of the national Wage Stabilization Board to force them to establish the union shop in their plants. In essence, the union shop means compulsory union membership.

They should resist not because of any financial advantage to the owners of the industry. There would be none. They should resist out of a decent regard for those ideals of our country which we are now fighting in Korea to protect. Moreover, their resistance would, as a matter of fact, benefit the leaders of the organized steel workers by protecting them from the certain and bitter fruits of their "victory" in getting the government to impose the union shop on the steel industry. Their successful resistance would also prevent Premier Stalin and his co-workers from enjoying a hearty laugh at our expense.

Fun for the Russians

This is why the Politburo would find the establishment of the union shop in the steel industry, at the behest of the Wage Stabilization Board, so profoundly amusing. We are fighting in Korea because we believe that armed aggression, promoted by Russia, menaces our freedom. And we are spending hundreds of billions of dollars here at home for armament to protect our freedom at other danger points. When this rearmament program is threatened by a crippling strike, the federal government through its Wage Stabilization Board proposes to buy off the threat by plowing under a vital element of that freedom which we are trying so desperately to preserve.

When the union shop is adopted through voluntary agreement, as it has been in cases covering millions of workers, it deeply undercuts the freedom of the individual. To hold his job he is required to join the union and support it financially whether he wants to or not. In the case of such voluntary agreement, however, the government takes no direct part in thus destroying the freedom of its citizens. It is essentially a private transaction.

Tyranny is the Word

But in the steel case the federal government becomes a party to a direct attempt to impose the union shop. Instead of protecting its citizens in their right to earn a livelihood, the government forces certain of them to join and support a private organization which they have clearly indicated they do not want to join. This they must do to hold their jobs. Tyranny is the accepted designation of government coercion of this kind.

It may be objected that the Wage Stabilization Board merely recommends the union shop, does not order it. This was also true of the action recently taken by a President's Emergency Board, which also "recommended" that working agreements between the

railroads and about a million non-operating railroad employees include a provision for the union shop. A government recommendation, however, can easily be given much of the force of an order, particularly by the calling of a strike to "uphold the hand of the government."

It seems entirely clear that in trying to impose the union shop on the steel industry the Wage Stabilization Board has completely lost its bearings. It was set up to handle labor problems to tide over an emergency. Now it comes up with a revolutionary modification of labor relations in the steel industry which, if adopted, would become a permanent part of the institutional machinery of the industry.

"Too Much Like Hitler"

Early in World War II an effort was made to have the federal government order the union shop for a group of organized coal miners. President Franklin D. Roosevelt, who will go down in history as one of organized labor's greatest champions, blocked it. "That," he said, "would be too much like the Hitler methods toward labor." But now, with supreme irony, the federal government fosters this Hitlerlike method toward labor ostensibly to advance our conflict with Stalin.

In persuading the Wage Stabilization Board to sponsor the union shop for steel workers, there is every reason to believe that the union leaders have trapped themselves. If the government imposes the union shop, a next step clearly becomes necessary. This is government regulation of the union in order to provide a modicum of protection for the minority that would be forced by the government to join against their will. It could be that for a time the government would ignore this obligation. But, having granted the union the power to eliminate the minority, it would sooner or later be forced to regulate the use of that power. Thus free collective bargaining and freedom itself would be the losers.

An Issue of Basic Principle

Resistance to a government-sponsored union shop for the steel industry is bound to bring harsh denunciation both from the administration and union leaders who have teamed to back it. Not only does the union shop relieve the union leaders of the problem of recruiting members, it also eliminates a group of workers that they stigmatize as "free riders"—namely, those who work for companies which have a working agreement with a union but do not join the union. In the basic steel industry about 10 per cent of those who work for companies with union agreements are not members of the union. Such a small percentage of non-members is obviously no threat to the "security" of the union, although that is what the drive for the union shop ostensibly is designed to protect.

In the reporting of the present labor dispute in the steel industry virtually all of the attention has been focussed on the handling of the issue of a wage increase and how large it should be. This, to be sure, is vitally important. Mobilization Director Wilson has said it is "a serious threat to our year-old effort to stabilize the economy." But certainly of comparable importance is the tremendous issue of principle raised by the government's backing of the union shop for the steel industry.

If the position of the Wage Stabilization Board on the union shop prevails, our government will have blunted the arms we are forging to fight for our freedom abroad by undermining a major bulwark of our freedom right here at home. At this critical time in the struggle to preserve and protect our freedom such a subversive course should be resisted to the limit.

McGraw-Hill Publishing Company, Inc.

FACTS NEEDED in a hurry? Management gets them quick when cards from file (right) are sped through sorter (rear), and pertinent data is handily tabulated by unit (left).

THE CARDS had previously been detailed with basic information by operators (above) highly adept in handling these fast-action, electro-mechanical punching machines.

CARD-SYSTEM ACCOUNTING Offers Multi-Advantages

It not only simplifies general, property, and payroll functions, but also swiftly yields a wealth of factual studies on all phases of operations

R. S. COONS
Assistant Secretary-Treasurer, Interstate Bakeries Corp., Kansas City, Mo.

Adoption of punched-card methods not only has simplified our accounting but has also provided us with greater flexibility and broadened the scope of operations in our firm.

Our company, Interstate Bakeries Corp. of Kansas City, Mo., operates wholesale plants in 19 cities—19 producing bread and 4 cakes and other cereal food products. Our industry lends itself to standardization of production and distribution, which is an aid to cost control. And there is little or no inventory on work in process or finished goods in this business.

But we run under high competition, with extremely narrow profit margins, hence there is constant need for extensive reports of detailed facts and figures to guide executive decisions—figures that must be produced quickly and at minimum cost.

The need for greater flexibility and scope in our accounting led us, in 1940, to install a Remington Rand numerical tabulator with summary punch, a sorter, and two automatic punches. In 1945, we added a Model 3 alphabetical tabulator and another automatic punch, primarily for tax and wage reports in connection with payroll accounting. Simplicity of operation was our aim.

Comprehensive Data Source

Our use of the punched-card system covers general, property, and payroll accounting functions. Many different records, reports, and studies may be made up by using the same punched cards. The data are obtained swiftly and accurately by arranging the cards into desired groups through the sorter, running at the rate of 420 per min., and then printing them in detail or in total through the tabulator, at the rate of 100 per min.

For certain types of reports, we find it an entirely practical operation to tabulate and align punched-card data on forms preprinted with descriptions and explanation. Multiple copies of any report are obtained through the hectographic process.

Our punched-card operation is regarded as a service function. The data from which cards are produced are compiled in other departments and checked as to accuracy and account distribution in the punching and verification processes.

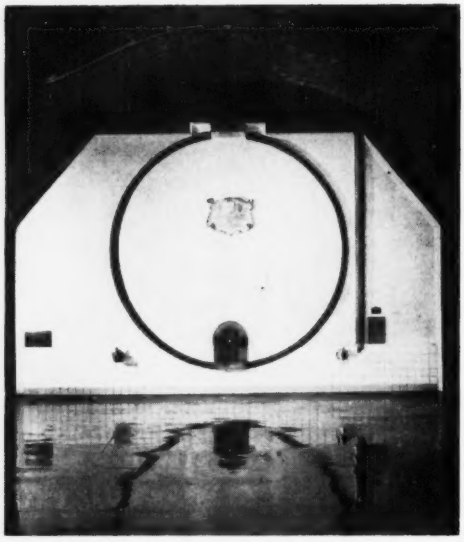
This audit is an important internal control factor. It follows that all books of records and reports compiled through use of these cards will be correct. Accurate distribution between plants and departments provides reliable data for cost studies and determinations. As an example of internal control, we use punched-card accounting in the verification of bank statements and in the reconciliation of bank accounts.

Fast With the Facts

Profit-and-loss statements tabulated on printed forms are available to management immediately after the last accounting entry for any operating unit. They cover the operations of each individual bakery's departments, the bakery as a whole, divisions con-

(*Turn to page 157*)

1 **WINES** selected throughout U. S. are shipped by tank trucks and pumped into these 1,000-gal. oak casks.



2 **GLASS-LINED** blending tank holds 25,575 gal. As many as 10 different wines are blended to make a batch.

Steps To a *Prize-Winning* Product

Cook's Imperial Champagne has often taken laurels from Europe's finest. Success is attributed to excellence of available American wines which are judiciously selected and blended by a top-notch champagne master

FE STAFF

You find plenty of modern mechanization when you step into the bottling room at American Wines.

Bottles are moving in split-second sequence from a late-model washer, to go through a high-speed ten-spout vacuum filler, served by two huge stainless steel product-supply vessels. Metal crowns are being applied at top rate. Throughout the tiled area there is a particular note of engineered efficiency.

But when you leave this fast-paced bottling department to tour other plant facilities, all resemblance to line-flow mechanization—now almost indigenous to American food processing—ceases to exist.

For this company is making champagne. And while the delicate, thoughtful care it devotes to the process might give an efficiency engineer ulcers—it's the necessary way to produce a distinctive product that just doesn't take to cost-cutting technics.

The American Wine Co. of St. Louis—oldest champagne maker in the U. S. A.—has tested for over a century the ideas of engineering-minded vintners. But aside from its modern bottling operation and strides in transportation, the process is basically much as it was when Isaac Cook started to export this famous American champagne to Europe in the 1860's.

Hanns Kornell, production manager and a fourth-generation wine-maker, readily admits that in-plant secrets and innovations are few and far between in his business. But he does attribute the company's highly successful product to two factors:

1. A top-notch champagne master to supervise technical aspects of the process—American Wine Co. is fortunate in having Eugene Schoenberger, former owner of one of the largest champagneries in Europe.

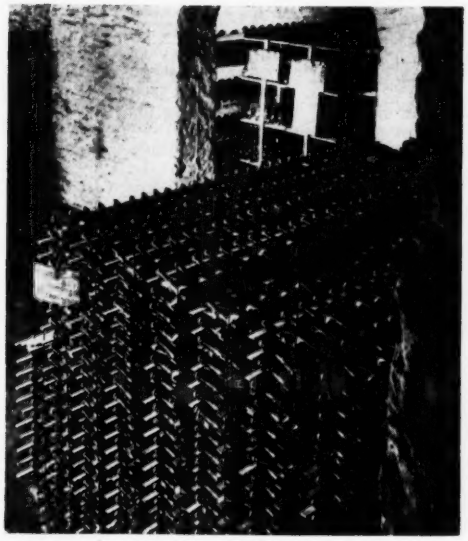
2. An uncompromising desire to secure the ideal wine types for its blend. Both Schoenberger and Kornell travel thousands of miles at grape-crushing time in procurement of choice varieties.

To appreciate fully the judgment that a champagne master and his associates exert, let us start with the selected wines and follow their progress to the inevitable ice bucket:

Missouri Grapes Distinct

From 10 to 15 different fermented grape juices are selected for blending into champagne. These are picked from samples sent in to St. Louis, or by direct visits to vineyards in California, Ohio, and New York. In addition, the plant uses the entire output of the reborn grape-growing industry in southwest Missouri.

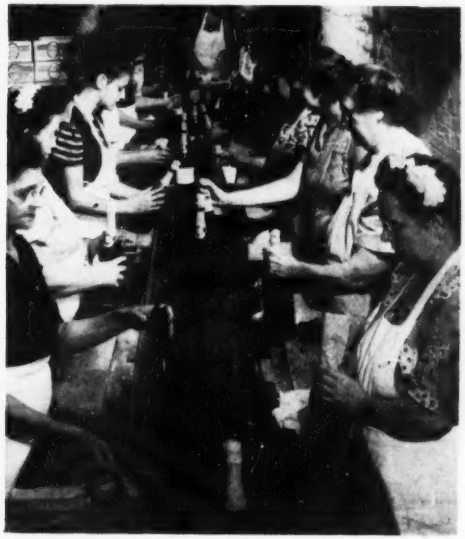
Strangely enough, the distinct flavor of Missouri grapes—grown on



3 **BOTTLED WINES** are stored 2 yr. in racks (foreground). Then bottles go on "riddling" racks (rear).

4 **"RIDDLING"** involves vibrating and moving each bottle quarter-turn daily. Clarity is gaged by candlelight.

5 **SEDIMENT** degorging. Bottles are then topped with wine and sweetener (center) and machine corked.



6 **BOTTLES** are labeled and metal capsule is applied over cork. Federal tax is paid at shipment.

a high calcium soil–has had much to do with the world-wide reputation achieved by the "Cook's Imperial" label. The unique after-taste of wine and champagne made from this fruit resembles the flavor of France's best and has brought the firm international awards.

Selected wines come to St. Louis in 8,000-gal. glass-lined tank cars and are transferred from them to plant by tank trucks. Wines are then stored until needed in 1,000-gal. white oak casks–some over 70 yr. old–in the underground vault.

In the fall, local vintages are brought in by tank truck and fermented in the plant. After fermentation, the wines are also stored in casks, ready for blending.

Champagne is blended in four two-story Bosari glass-lined tanks. Three hold 12,500 gal. and one 25,575 gal. Various wines are pumped from

storage casks to form a batch or cuvee (French, meaning, figuratively, a marriage of the wines). The selection of wines for the cuvee and supervision of their blending is perhaps the most critical function of the champagne master. His activities are guided by chemical analysis and an intricate program of tasting.

Blending of fine champagne defies exact quantitative measures. It is doubtful if taste perception here will ever be completely supplanted by chemical tests. Hence, the extreme importance of conducting this operation under the guidance of an experienced champagne master.

Another addition to the blending tank is a dosage of yeast-inoculated wine and sucrose syrup, the purpose of which is to induce a secondary fermentation in the bottle.

"Tirages" Are Semi-Annual

After blending and initial fermentation, the champagne is pumped up to the bottling department. Blending a quantity of champagne and then filling it into bottles is called a "tirage." Only two tirages take place each year—in the spring and fall. But actual bottling operations may run steadily for almost a month and yield about 500,000 fifths.

In the bottling room, the wine is fed into two 1,120-gal. stainless steel surge tanks which supply the filler in sequence. Prior to bottling, each tank batch of wine receives a "tirage dosage" of sugar and yeast through a Mojonnier ten-spout vacuum filler.

All bottles are extra-thick, green-tinted, one-use units, built to withstand over 300 psi. They are roughly cleaned in a Miller Hydro Washer prior to filling. During a tirage, 20,000 bottles may be filled in one day. A Cemco "Jumbo" sealer applies a conventional metal crown, this being later replaced by the usual champagne cork.

After bottling, the wine is moved in trucks 60 ft. underground to tirage caverns, where the year-'round temperature is about 60 deg. F. These cellars—divided into three levels—honeycomb the solid rock under a main St. Louis thoroughfare and are cooled, in part, by an underground spring. Space for ageing as many as 2,000,000 bottles is provided.

Bottles are first stacked on their sides in plywood racks that are 15 or 20 ft. high. Storage in this position last for the better part of two years. At least twice a year during this time, each bottle is lifted from the rack and shaken to give the yeast its full strength to expand its fermenting action.

During this period the yeast produces the secondary, in-bottle fermentation, which is responsible for the effervescence of champagne.

Numerous attempts have been made to speed up or improve upon this natural, in-bottle fermentation. But the process still remains as it was centuries ago. The Charmot bulk fermentation process, however, has brought decided production benefits to the maker of less costly champagnes (see page 523, Apr. 1948 *Food Industries*).

"Riddling" Is Next

After secondary fermentation is completed and the wine is properly aged—as determined by sampling tests—bottles are transferred to the lower cellar for "riddling" (clarification). Here, each bottle's bottom rim gets a white-paint mark, then the bottle is placed neck down in the wooden riddling racks.

During the next two or three months, each bottle is given a daily vibration and its white mark moved a quarter turn. Several men in the plant do nothing but riddle—an average day's work being about 20,000 bottles per man.

Purpose of riddling is to deposit all sediment in the neck of the bottle. Twisting assures freedom from an accumulation along the side of the bottle. Also, the tilt of the bottle is increased from 50 deg. to vertical.

After about six weeks in this phase, the bottles are inspected by candlelight—no other illumination source has proven satisfactory—and the process terminated if the wine shows absolute clarity.

Bottles are then loaded, still neck down, into baskets and hauled by rope and pulley to the "degorging room." Here, the necks of bottles are first lowered into a long tank containing −10 deg. F. brine, which freezes the yeast sediment and wine in the neck. This ice plug is then inspected, again by candle-light, to be sure that no unfrozen sediment remains.

"Degorging" the Sediment

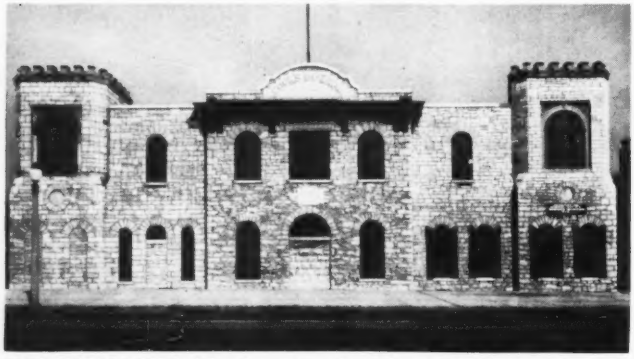
During secondary fermentation, over 100 psi. of pressure is built up inside the bottle to "degorge" the ice-chunk sediment. The neck of the bottle is pointed into a three-sided stainless steel chamber and its cap is removed. Forcing the frozen plug out in this manner (a fast thumb plugs the bottle) results in a loss of only an ounce or two of wine.

Degorged bottles are quickly transferred to a rotating stand on an air-tight filler, where wine from the same cuvee, syrup, and some aged wine is added to bring the contents to an exact fifth. Made in France, the special filler unit is known as a dosage machine, and the process is known as dosing. The ingredients used have considerable influence on the sweetness of the champagne.

Finally, a four-piece Spanish cork is forced, by a special machine into the neck of the bottle by compressed air. The corks have two vertical and two horizontal sections, a construction which provides great strength and leakproofness.

Corked bottles are first washed free of riddling paint, then carted to temporary storage until needed by the shipping department to fill a specific order. Consequently, as much as six months usually elapses between dosing and application of the fancy metal capsule and label.

As the St. Louis winery is bonded, none of its champagne is tax paid until it leaves the plant. Federal tax on champagne amounts to $0.68 per fifth. The industry as a whole has vigorously protested this impost, terming it a "tax on bubbles."



THIS CASTLE-LIKE building houses American Wines' Champagne plant—oldest in U. S. Below it are four large storage levels hewed out of solid rock.

"IF, IN THE PROCESSING and bottling of fluid milk in a plant, it were found that one of the filling machines was squirting a half-ounce of milk down a hidden drain for every quart that it bottled, there would be fast action on someone's part to bring that loss to a halt.

"Yet, in many cases the trucks in dairy fleets are hidden drains, not of milk but of money, and every mile they roll piles up the money loss higher and higher."— R. T. Jennings, GMC Truck & Coach Division.

How to Switch Delivery Dollars Into Greater Net Profits

Managements have "virtually untapped" opportunity to boost the incomes of their companies, say investigators, by mere common-sense plugging of cost leaks in the fleet operations

G. S. SOTIER
FE Correspondent, Detroit

Not only are processors everywhere moving out their foods in trucks—but a surprisingly high number of them are also moving out a sizable portion of their profits in the same vehicles!

This, bluntly, is the finding of a comprehensive survey being conducted by the General Motors Corp. Truck & Coach Division.

To put it frankly, the investigators uncovered a widespread lack of understanding on the part of managements when it comes to transportation problems. In company after company, they found fleet-operation outlays considered as static charges to be constantly accepted—rather than as volatile charges continually to be questioned in the light of true business economy.

Under the spotlight here was the dairy industry, which is unrivaled in the extent of the delivery service it provides for its customers.

Collecting a highly perishable product from remote farms scattered over hundreds of square miles, it moves it quickly and continuously through central processing and bottling right to the consumers' doorsteps. The various transportation assignments of the milk industry have become "special delivery service" on a nationwide scale.

Yet, despite these vast trucking operations, many individual dairies today pay little more attention to the efficient management of their fleets than they did when old Dobbin was hauling the wagon from house to house.

To date approximately 14 dairy operations in as many communities have been studied. These dairies maintain some 2,200 trucks and extend their delivery service over several hundred miles.

Although the survey is still in progress, findings thus far indicate that delivery operations, which represent 16 percent of the controllable costs of running a milk business, are virtually untapped as sources for savings.

Five Steps Do It

1. **Install practical records**
2. **Adopt preventive maintenance**
3. **Set up adequate facilities**
4. **Replace inefficient vehicles**
5. **Keep watching those costs**

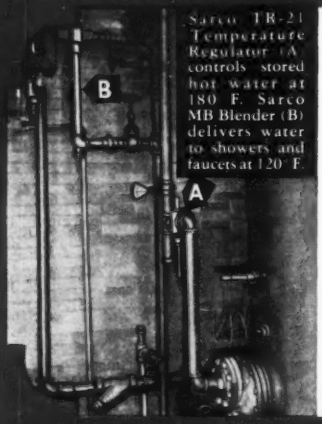
How Dollar Is Divided

Of every sales dollar taken in, approximately 76c. goes out for uncontrollable expenses.

About 58c. is directly or indirectly paid to producers. This expense is fixed, and consequently offers little or no opportunity for economics.

Likewise, most dairies already have modern processing equipment and methods, so there is little possibility of a material reduction in plant expense, which accounts for another 18 percent of the sales dollar. This is particularly true in the face of up-

Don't Waste It



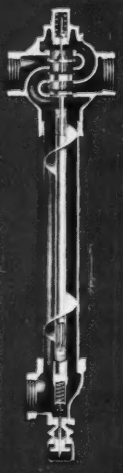
Sarco TR-21 Temperature Regulator (A) controls stored hot water at 180° F. Sarco MB Blender (B) delivers water to showers and faucets at 120° F.

In most plants and institutions hot water is stored for periodic use in process work, gang showers, group wash basins, etc.

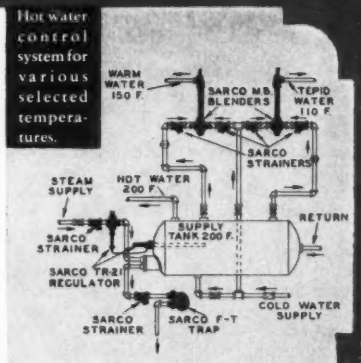
Much of this water (often carried at 180 or 200° F) is wasted by allowing manual temperature adjustment at the point of use.

Avoid buying additional Water Heater capacity by installing Sarco Water Blenders.

Blend It



Sarco Water Blender type MB provides tempered water at any desired constant temperature.



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ward pressures on wages, and increased costs of supplies and equipment.

For most dairies, the costs over which they have control are: sales, administration, and delivery, which represent the remaining 24 percent of the sales dollar.

Of these controllable costs, sales (including advertising) make up 68 percent, administration 16 percent, and delivery another 16 percent. GMC investigators contend that delivery's percentage, if properly regulated, can yield many dollars in savings and more efficient delivery service.

Detailed below are the findings of the survey group together with recommendations for notable, business-building economies:

Get the Right Equipment

While trucks in the retail milk business should last a long time, it is false economy to pour good money after bad into antiquated equipment. If enough money is spent, any vehicle can be kept in running condition. But somewhere along the way the point of diminishing returns is reached—that's the time to scrap the old and get the new.

The GMC surveyors found one dairy still using electric delivery trucks in the false belief that they were saving money. Other dairies kept trucks on the road at actually greater overall expense than would have been incurred if the old vehicles had been sold and new equipment bought.

When the time does come to purchase the new equipment, the survey group advises operators to consult a salesman about engine power and transmission and axle ratios, as well as truck capacity, for such factors have a decided bearing on how well the unit will perform, for what period of time, and with what economy. And few plant men are expert enough to make the correct choice.

Get Good Drivers

The survey group found a very serious need for better selection and training of drivers. In no single instance did it find a really good system of driver control.

In the milk industry, the driver's ability as a route salesman often is regarded by management as far more important than as a truck driver. True, this was found to have justification; nevertheless, a bad driver can cost hundreds of dollars a year in lower vehicle efficiency, excessive maintenance expense, and accidents. The survey team suggests that much more effort should be made to create *good drivers* out of *good route salesmen*.

Unfortunately, most of the loss due to poor drivers is not directly attributed to them.

In one dairy, for example, a driver training program was instituted at the suggestion of the AAA after maintenance costs had zoomed to a level which was out of reasonable proportions. Management went along with the idea, although in the beginning it felt that most of its drivers were good enough, hence that the program was not greatly needed. However, because of the large number of trucks involved, the company, much to its surprise, saved several thousand dollars a year through generally improved driving practices.

In maintenance operations the same serious deficiencies of good personnel often crop up. Many dairies were found to hire second-rate mechanics in order to save the higher labor costs of top grade men. Savings are seldom realized by such a move, however, since maintenance work is then too often done incompetently, replacement parts are demanded much more frequently, and vehicle life is shortened considerably.

When a dairy fleet is not being properly cared for, big reason often is insufficient maintenance personnel.

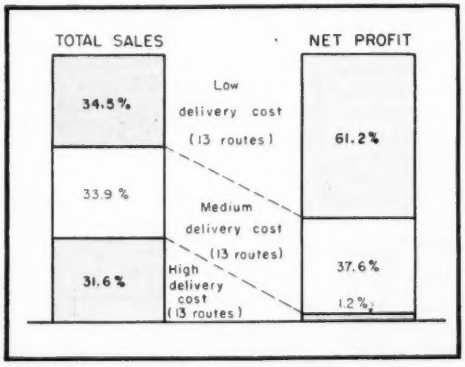
Although it is difficult to apply a completely accurate figure for manpower requirements in dairy fleets, the investigators estimated that, to do a good maintenance job, approximately one man was needed for every seven or eight trucks.

This presupposes that these people will be first class workers who know their jobs. Actual requirements for the individual dairy can be plotted by any qualified fleet superintendent.

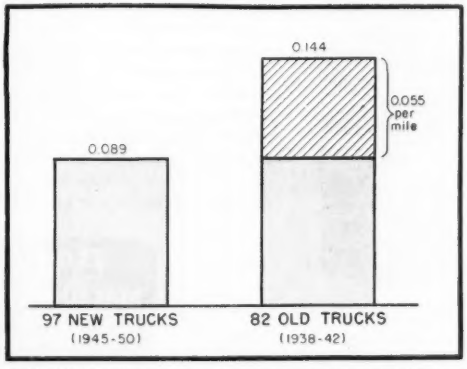
The important thing, the survey team reported, is that no company can have a well-maintained, economical fleet without having the people available to do the work as it should be done.

In one dairy, it was found that a fleet of 35 vehicles of comparable size and capacity yielded performances ranging from 2.4 to 6.9 miles per gallon. The average was only 4.7 mpg. But if the 12 trucks that were poorest in performance were brought up to this latter figure—regarded as a rather low fleet average—the savings in fuel costs alone would be $1,170 per year. Based on ¼¢ per qt. net profit, that $1,170 would

Charts on Two Companies Show How Dollars "Slip Through Fingers"

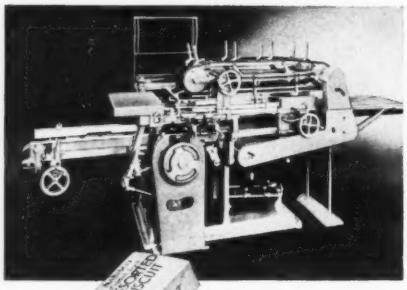


COMPANY A—Breakdown of net profits of 39 dairy routes into three approximately equal sales groups (based on delivery costs) reveals how low-cost routes accounted for more than 60 percent of total. High-cost group contributed barely more than 1 percent.



COMPANY B—When operating costs of 97 new trucks were compared with those of 82 old ones (same make and model), aged vehicles were found to cost 5½¢ more for each mile they were driven. Here, savings could be approximately $25,000 per year.

Most Versatile... Most Widely Used



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Here's a machine that can be adapted to the wrapping of a great variety of products, and does a superb job. Handles goods on cards, or in open boats as well as regular cartons.

The FA can be adapted to virtually any type of wrapping material. This enables you to design an ideal package—both from the standpoint of protection and eye appeal. The wrapping material may be in roll form or, in the sheet-feed model, cut-to-size sheets. When *printed* roll material is used, the machine registers the wrapper accurately on the package by electric eye. Can be equipped to apply end labels and top labels. An easy-opening tape may be incorporated in the wrapper, if desired.

WIDE SIZE RANGE

One FA machine will accommodate a wide range of sizes—some users wrap over a dozen sizes. This, combined with its speed of 100 packages a minute, means utmost production from a single machine.

Packages may be fed automatically from cartoning machines. Speed can be adjusted by hand-wheel while machine is in operation. Changes from one package size to another are quickly made by simple hand-wheel adjustments and the substitution of a few parts. Automatic stops prevent feeding of wrapping material when no package is in place or if a jam occurs.

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represent the profit on 351,000 qt. of milk.) Yet this loss had continued over a long period with nobody making an effort to analyze the situation and correct the flaws.

Not only could good preventive maintenance have saved much gasoline in this dairy, but expensive parts replacement, road calls, and costly accidents could have been minimized.

Records Are Indispensable

Lack of good fleet history records in almost every dairy investigated accounted for money losses for replacement parts that could easily be avoided. At one dairy, 28 clutch jobs were performed in a fleet of 30 vehicles over a one-year period. At first glance there may appear to be nothing particularly unreasonable about this figure. But a check showed that 16 of these jobs required replacement of *both* the clutch disk and the pressure plate.

In all probability, pressure plates, which are expensive items, had to be replaced practically every time the clutch was overhauled, because the unit was run too long—in short, the rivets in the disk scored the machined surface of the plate. The investigators estimated that at least two-thirds of these pressure plate replacements could have been avoided with proper maintenance, facilitated by a scheduled unit overhaul program.

The surveyors also found that much the same haphazard inspection program and maintenance schedule holds true on brake work. Brakes are frequently run until they have begun to score the drums. Instead of a comparatively simple relining job, it then becomes necessary to remove the brake drums, have them machined to remove the scores, reinstall the drums, and then reline the brakes.

With a good preventive maintenance program, administered by capable people and designed to meet the requirements of the fleet, such wasteful practices disappear—and net profits increase.

—*End*—

Food Research Zooms

—*Continued from page 71*

Dairy Products Co. Last year some 400 scientists and assistants were working in their laboratories, with special emphasis placed on cheese-product developments, food chemistry, and by-product utilization. In size of staffs, Borden's comes next in importance,

with nearly 100 scientists and supporting personnel.

General Mills, Inc., is the leading company in the flour and cereal products field, with more than 360 persons engaged in research. International Milling Co., Ralston-Purina, Quaker Oats, and Pillsbury Mills each employed between 60 and 100 scientists and helpers.

As shown in Table II, 559 research workers were employed in the processing of different types of vegetable oils, almost half of these being maintained on the payroll of the Corn Products Refining Co. Next largest staffs are supported by A. E. Staley Mfg. Co., while Drackett, Glidden and Clinton Foods each engaged the services of some 60 laboratory workers.

In comparison with the activities mentioned above, canning companies employ relatively small research staffs. In 1950 the seven leading companies in the field employed about 380 research workers. Among them, California Packing and H. J. Heinz were noted as leading the group of smaller staffs assigned by the other five (Beech-Nut, Stokely-Van Camp, Campbell Soup Co., Minnesota Valley Canning Co., and Hawaiian Pineapple Co.).

Among the sugar refineries, the largest research staff is maintained by California-Hawaiian Sugar Co., but as seen in Table II the industry supported only about 240 scientists and assistants in 1950.

Also to be considered here is the research work conducted by the various industry groups. The following four, by way of example, account for more than 170 workers:

The Nutrition Foundation, Inc., New York City, with an annual expenditure of $350,000, reports that 80 persons are currently receiving grants from the Foundation in support of either full or part-time research work.

At the American Meat Institute Foundation, operating laboratories in a $560,000 specially constructed building in Chicago, there are employed about 50 research workers. Here, expenditure figures vary, with outlays of funds made as different research projects become essential.

The National Canners Assn. has some 30 researchers in its Berkeley, Calif., and Washington, D. C., laboratories, with the current research budget totaling in the neighborhood of $320,000 (exclusive of building operation and maintenance).

And the American Institute of Baking employs in its Chicago laboratories 11 persons in research activities, with the budget averaging about $125,000 yearly. In addition, the AIB's Department of Bakery Sanitation has its own laboratory for investigative work.

Prime mention must be made, too, of the Government's broad food research activities in the Department of Agriculture's regional laboratories. Moreover, there are the various contributions of the schools and colleges —accounting for a considerable number of workers on various projects,

Here's Line-Up of Coming FE Articles

Special features emphasizing the "what, why, and how to do it" are scheduled for early issues of FE—all "engineered" to help you produce higher quality foods at lower costs. These are just a few of them—

Report and Flowsheet: Engineering Progress in Winemaking

Dairy Builds Broad Markets by Creative Processing

Quality Control and Efficiency in Small Freezing Plant

Advanced Engineering in Large, Modern Biscuit Bakery

How to Correct Employees' Mistakes

New Special Mix Makes Longer-Lasting Concrete Floors

Lift Trucks Multiply Capacity and Save Plant Expansion Costs

Improved Technics Speed Cereal Plant Operations

Better Food for the Navy

Effect of Processing on Nutritive Values

Selling Quality to Franchised Bottlers

How Advanced Practices Gear Multi-Product Processing

Production-Planned Meat Packing Plant

Sharp Figuring on Factors Boosts Refrigeration Performance

when *Uniformity*
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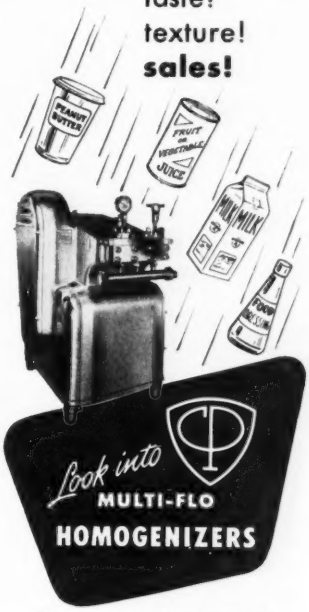

The eye-appeal of smooth texture and rich uniformity is one of the most powerful sales boosters for practically any liquid or viscous food product. Making *your* product look better, and/or taste better, just naturally suggests "Buy this—buy it often!"

Processors of many kinds of food products have found the answer in homogenization by CP Multi-Flo Homogenizers . . . and at almost negligible unit cost. *CP* Homogenizers provide lower operating pressures, minimum maintenance, easier cleaning and the unique CP "Single Service" Valve. Find out what CP Multi-Flo Homogenizers can do for you. Write for bulletin and tell us what you make.

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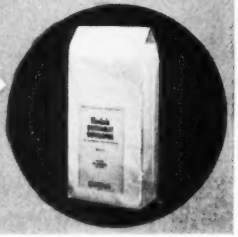

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many of which are specially supported by food interests.

Allied Industry Contributions

In addition to these many endeavors there is the very significant scientific work carried on by the manufacturers of food processing machinery and equipment and by those making cans, paper containers, and the like. Among the important concerns here are American Can Co., with a research staff exceeding 300 people, Food Machinery Corp., with about 200 persons on the laboratory staff, and Continental Can Co. with 230.

As for type of personnel employed, of a total of some 5,800 researchers in food lines in 1950, nearly 1,800 were chemists. About 2,900 were supporting personnel of various types—assistants, apparatus makers, clerks, etc. There were in addition some 480 engineers and 280 biologists. The remaining 340 represented various other professions.

As given in *Research and Development Personnel in Industrial Laboratories, 1950* (Scientific Manpower Series, No. 1, report of National Academy of Sciences—National Research Council), the breakdown of research laboratory personnel in the food industry in '50 was as follows:

Biologists, 282; chemists, 1,789; M.D.'s, 5; engineers, 475; geologists, 1; metallurgists, 6; physicists, 10; psychologists, 8; and unclassified, 319.

This totals to 2,895 professional personnel. And with 2,903 supporting personnel, the grand total is 5,798.

End (*Resume reading on page 72*)

Making Liquid Sugars

—*Continued from page 70*

the lower amount of invert sugar is used to make sucrose syrup.

Sucrose syrup from the evaporators is tested hourly for Brix, color, pH, iron, and invert sugar. Blends are then "tailor-made", according to these analyses for specific needs.

Invert syrup discharged from the ion exchange beds is tested for pH, invert sugar, color, iron, and ash. Amount of invert sugar indicates the extent of acid-inversion in the cation beds. And the ash content reveals the efficiency of the ion system in removing cations and anions.

Similarly, invert syrup from evaporators is checked for Brix, color, pH, invert sugar, and iron. And it is blended according to industry requirements.

Finally, refined sugar is tested for particle size, color, and moisture content.

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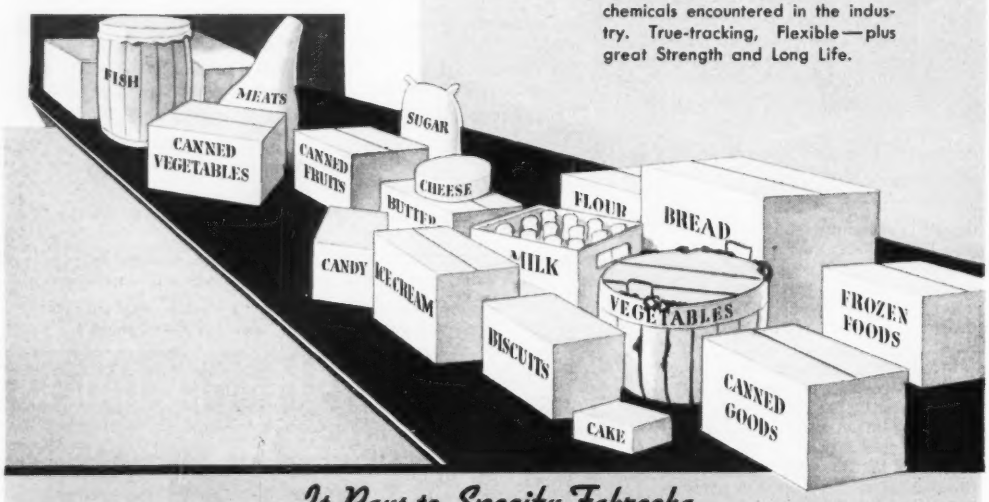

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As a further safeguard on the quality of liquid sugars, a rigid inspection system has been set up. Checked by the inspectors is the cleanliness of storage tanks, drums, barges, tank cars, freighters, and tank trucks. Samples of all shipments are also collected and submitted to the bacteriological laboratory. And the chief inspector daily examines quality control and bacteriological records to ascertain the quality of finished products.

Additional samples of outgoing shipments are collected and kept several weeks in a constant-temperature cold room. These are analyzed by the control laboratory in the event of any questions from users relative to the shipment.

End (*Resume reading on page 71*)

Switching to Continuous?

—*Continued from page 75*

predetermined quantity of liquid has passed through the metering device, the float completely shuts off flow.

To start the mix-making operation, controllers are set to deliver the required number of pounds per minute of the various liquid ingredients. Then flow is started through the meters and into one of the two heater supply tanks.

When the level of the liquid mixture reaches a pre-determined point in the supply tank, a pump is started which draws liquid from the tank, forces it through the preheater and to the cream shaving machine. Here, the required number of pounds of frozen 80-percent cream are incorporated in the moving stream of heated ingredients, which is then pumped through the Ste-Vac, where it is heated to 170 deg. F., and discharged into one of the 500-gal. holder-pasteurizers.

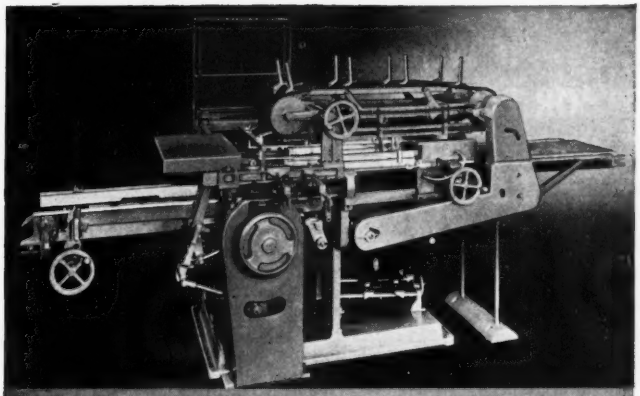
A Telegage system is used to check usage of milk and syrup from tanks on floor above.

Dry ingredients, such as stabilizers and powdered chocolate, are now added (through a chute from the floor above) to the pasteurizers.

The automatic controllers stop flow of the three liquid ingredients when required amounts of each have been metered into the heater supply tank.

Operator then changes valves to divert flow from Flowrators to the other supply tank, resets controllers, and thus starts production of another 500-gal. batch.

After a 20-min. holding period in the pasteurizer, the mix is homogenized, cooled on a cabinet cooler, and



Model FA Wrapping Machine, made by PACKAGE MACHINERY COMPANY, Springfield, Mass.

–they say:

"We recommend This Lubricant to Our Customers"

"We have found LUBRIPLATE Lubricants to be very effective and use them extensively in our machines."

"To assure the proper use of LUBRIPLATE Lubricants for re-lubrication, we place tags on our machines before shipment. Thus the purchasers of those machines know the LUBRIPLATE Product we recommend for each application and where to obtain it."

The Package Machinery Company of Springfield, Massachusetts is among the earliest users of LUBRIPLATE Lubricants. They use them for original lubrications because LUBRIPLATE Lubricants arrest progressive wear and add longer life to moving parts. They recommend them for re-lubrication to preserve the efficiency of the machines, to reduce power costs and minimize service work and parts replacement.

LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases. There is a LUBRIPLATE Product best for your every lubrication need. Write for case histories of the use of LUBRIPLATE in *YOUR* industry.

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DEALERS EVERYWHERE . . . CONSULT YOUR CLASSIFIED TELEPHONE BOOK

LUBRIPLATE *THE MODERN LUBRICANT*

IF WEIGHING, BLENDING OR PROPORTIONING MATERIALS IS IMPORTANT TO YOU . . .

THIS NEW GUIDE IS MUST READING

Richardson's new guide to automatic weighing, blending or proportioning of materials points out *new methods-new equipment applications* in these important processes. Simply find your material in the index, refer to the equipment section and you're on your way to improving your present operations through increased speed, economy and accuracy.

Let Richardson's 50 years of experience in building Automatic Weighing, Proportioning and Blending, equipment help you discover new and improved methods in your field—no matter what you handle.

Write today for your free copy of this guide Bulletin No. 0450.

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Richardson
MATERIALS HANDLING BY WEIGHT SINCE 1902

pumped into one of the large storage tanks.

The present system, which has a capacity of 2,000 gal. per hr., has completely eliminated the handling of milk cans and bags of sugar. When converted to the HTST method, it will be capable of handling at least 3,000 gal. mix per hr.

End *(Resume reading on page 76)*

Card-System Accounting

—Continued from page 143

sisting of several bakeries, and finally the company as a whole.

The statements are byproducts of the punched cards used to produce the records of cash disbursements, of vouchers, of operating ledgers, and of sundry other accounts. Other byproducts consist of comparisons of actual operations with budgets and standards previously set for delivery truck operations, bakery repairs and supplies, advertising, and other classes of controllable expenses.

Used on Depreciation

We find that unit or itemized plant and equipment and depreciation records are easily maintained by use of the cards. Tabulated comparisons of actual expenditures are prepared regularly with authorized expenditures. Depreciation is computed by units of property. Facilities when depreciated to their salvage values are eliminated through selective sorting of the cards.

Statements showing gain or loss from the retirements of facilities are turned out regularly as still another byproduct of the monthly operation. Through this step a complete history of all changes in fixed asset accounts is readily available at all times.

Also, the system proved an invaluable aid in the preparation of many tax returns. Selected sorting of the property cards permits study of how future operations will be affected by exhaustion of fixed assets through depreciation charges.

The alphabetical tabulator and punched cards have greatly simplified the maintenance of the wage and tax records of our employees. Quarterly Social Security reports, with the exception of those for three states requiring slip reporting, are merely a tabulation of names and wages from weekly wage cards. By use of those cards, we quickly get accurate yearly wage statements—it being a mere routine job of tabulating them on forms prescribed for that purpose.

End *(Resume reading on page 144)*

[redacted] Can Only Guess!

You cannot know the difference between the natural and the imitation by appearance, color or taste... You can ONLY guess!

FLORASYNTH'S *amazing new*

RASPBERRY Imitation SPECIAL

it is rightfully compared to Nature's best... reflecting the sheer skill of our flavor craftsmen in its lasting, highly effective and economical utility...

(Prove its practical advantages to yourself.)

Sample upon request.

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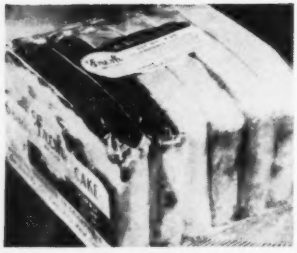
Florasynth Labs. (Canada) Ltd.—Montreal • Toronto • Vancouver • Winnipeg • Florasynth Laboratorios de Mexico S.A., Mexico City

NEW PACKAGES & PRODUCTS



Many New Type Packs Using Film-Wraps

A material playing an ever-bigger role in modern packaging is cellophane, as indicated by an interesting exhibit of E. I. Du Pont De Nemours & Co., Inc., Wilmington, Del., at the recent National Packaging Exposition in Atlantic City.

With store owners recognizing the added appeal of products especially packaged to create impulse buying—particularly in self-service stores, which are so rapidly gaining in popularity—much thought is being given by food processors to the new technics.

A survey of the latest packages shows that in addition to attractiveness, growing consideration is being given to protective quality, ease of handling, product visibility, the values of multi-unit packages, and the appeal of small-family packs.

Above are illustrated some of the most interesting packs, utilizing cellophane, as seen in the Du Pont exhibit.

Variety of Products

Unique are the packages of bacon (½ lb. and 1 lb.) with the slices cut in halves. This convenient feature was developed after a survey disclosed that a large percentage of housewives preferred bacon in half slices.

Another meat item, developed specifically for the small family is the self-service package combining frankfurters and sauerkraut. It contains enough for a meal for two persons.

Another novel meat pack (not illustrated here) contains half a small ham, with one slice conveniently precut. Both are combined in transparent wraps.

An unusual and convenient item in the confectionery field is the package which dispenses mints. As shown, a few of the candies are fed, as wanted, in "tear-off" cellophane packets, which unwind on a tape through a slit in the box.

In the bakery line there is a new saltine package which gives the consumer freshness and sanitary features formerly available only to the institutional trade. This package contains 18 cellophane packets, each with 4 saltines.

Again in the bakery field there is a cake package to satisfy the whole family. Here, three different varieties of sliced cake are contained in a film package, two slices of each variety in separate inner packs.

Other special bakery packs (not shown here) included a small loaf of bread, and a tray of four graham crackers each separately packaged in cellophane.

For the small family, the new overwrapped tray carrying four bags of dried vegetables—beans, lentils, green peas, and yellow peas—is finding favor. Each individual bag contains a cupful, enough for a small serving without waste.

A novel idea, too, is the new apple bag—containing fruit that has been cleaned, cored, and chilled to proper temperature before being packed. In addition to general marketing, this item can be sold from vending machines.

Grapes are being marketed in overwrapped trays (not illustrated).

Film wraps attractively designed with special appeal to children are also being offered for such food items as cereals, puddings, and confectionery.

All these packs have been designed to give maximum visibility of the product, while still allowing sufficient space for brand identification, price marking, recipe, instructions, and other pertinent data.

For More Data on Package Supplies Named Use Reader Service Card

For profitable glass performance

– ARMSTRONG'S

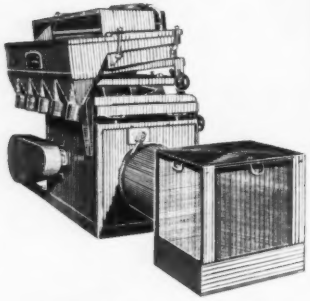
Armstrong's Glass Containers can do a lot to make your bottling operation more profitable. They're precision-engineered to perform better on your filling lines. Their uniform finish and carefully formed base contours help keep lines flowing smoothly . . . step up efficiency . . . trim downtime to a minimum. Performance like that pays off—in greater economy, increased production, more profits. Get further information on Armstrong's *complete* packaging service today. Just contact your near-by Armstrong representative or write direct to Armstrong Cork Company, Glass and Closure Division, 4205 Prince Street, Lancaster, Pennsylvania.

Packaging Headquarters for Metal and Armold Plastic Caps, Corks, Crowns, and Du Pont "Cel-O-Seal" Bands.

we can give you

58

good reasons why...



...it makes good sense to sit down and study out all the economic advantages of cleaning, classifying, and up-grading dry food products with Sutton Specific Gravity Separators and Air-Float Stoners. Upon request, you will immediately receive a list of 58 different food and cereal products, each representing a distinct separating problem solved by *"effecting a difference in specific gravity through air-flotation."* Chances are, the S S & S Process will answer your problem, too.

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SUTTON, STEELE & STEELE, INC.

Aims Packages for Big Institutional Potential

With 567,000 institutions in this country serving more than 65,000,000 meals each year, the institutional division of Kraft Foods Co., Chicago, is conducting an extensive campaign on its entire line of cheeses, salad dressings, margarine, confections, and salad oil.

In the cheese line the company offers its ribbon slices of pasteurized process American cheese in packages specially marked to make it extremely easy to cut the ribbons into 48 perfect sandwich slices or 64 "just right" cheeseburger slices. Then there is the sharp cheddar packaged in 10-lb. bars with no rind or waste. The square shape makes it simpler to cut into slices, cubes, or wedges.

Elkhorn pasteurized process American cheese, put up in 5-lb. loaves, is considered ideal for cooked dishes. The Casino Swiss, with no rind or waste, can be obtained in either sandwich cuts of 6-lb. or in 40-lb. blocks.

In addition, various other flavors of pasteurized cheeses are available, as well as cream cheese and grated cheeses.

Miracle Whip, French dressing, Kitchen-Fresh mayonnaise, and Sea Island dressing are some of the salad dressing and oils offered in bulk.

Seen in the photo above is a representative selection of both institutional and over-the-counter products offered by the company. Note how the retail bottles of salad dressing, mustard, and grated cheese (lower center) compare with the institutional sizes.

Also to be mentioned as newest in company's line of institutional products are individual portions of jellies, jams, and cranberry sauce (not shown here, but pictured p. 146 Apr. FE).

Kraft maintains a cuisine service department that assists institutions with suggestions on planning and preparing either full course dinners—soups, main dishes, salads, and desserts—or sandwich fare.

Benefits In Multi-Unit Bag

A special multiple-unit bag has been adopted by Sheffield Farms Co., Inc., New York City, for use in route-truck distribution of its Sealtest cottage cheese.

Six 8-oz. cups of the product are packed in each bag. Five filled bags are carried in a wooden case. This new system reduces materially the handling and storage space required—for it increases the number of cups in each case from 18 to 30. A code number on the top of each bag identifies the contents.

Since the bags are of wet-strength

paper, ice can be placed directly on each case of cheese, thus eliminating a temperature problem while the cheese is enroute.

Other advantages cited are reduction in cost of packaging and protection of the cups from damage and soiling.

Bags are furnished by Union Bag & Paper Corp., New York City.

For Package Data Use Reader Service

Cereal In Ration Form

A new cereal item for use in ration and survival kits has been developed by the Quartermaster Food & Container Institute, Chicago. It is made in either bar or disk form from a variety of cereals.

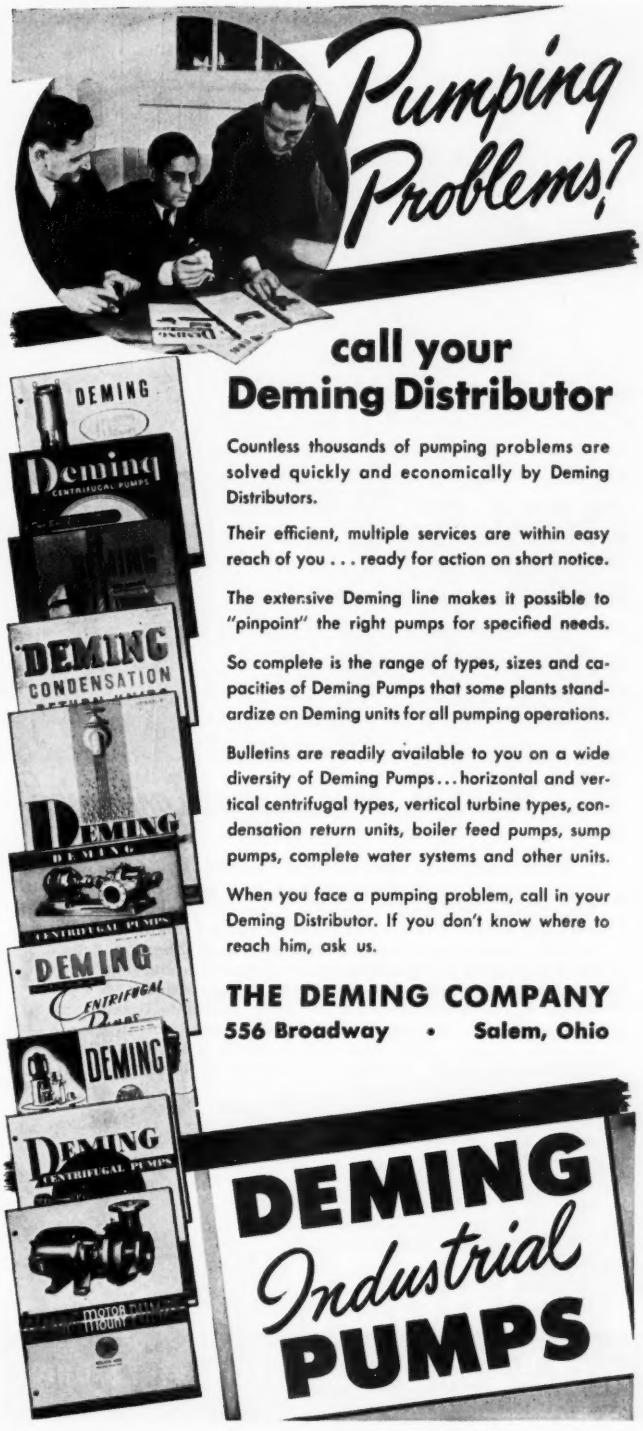
Included in present specifications are malted cereal granules, shredded corn and soya cereal, corn flakes, wheat flakes, puffed rice, 40% bran flakes, and also various combinations.

The compressed bar weighs about 1.5 oz., while the compressed disk scales about 2 oz.

The cereal formula calls for at least 60 parts by weight of cereal ingredients, 14 parts non-fat dry milk solids, 10 parts shortening, and 14 parts sugar. Two parts glycerine—the final ingredient—bind these materials together into the compact, ready-to-eat form which can be consumed dry or reconstituted (photo) in hot or cold water.

After repeated experimentation in developing this compressed, premixed cereal, glycerine was chosen as the substance which would best enhance sweetening, while restraining stickiness, spoilage, mold growth, and which —most important of all—would be entirely non-toxic.

It is said the glycerine helps to give the premixed cereal the right amount of crispness and also aids in preserving the flavor and freshness of the other ingredients.


Pumping Problems?
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CENTRIFUGAL PUMPS
DEMING
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The extensive Deming line makes it possible to "pinpoint" the right pumps for specified needs.
So complete is the range of types, sizes and capacities of Deming Pumps that some plants standardize on Deming units for all pumping operations.
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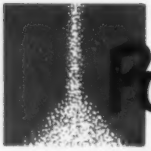
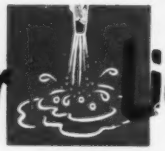
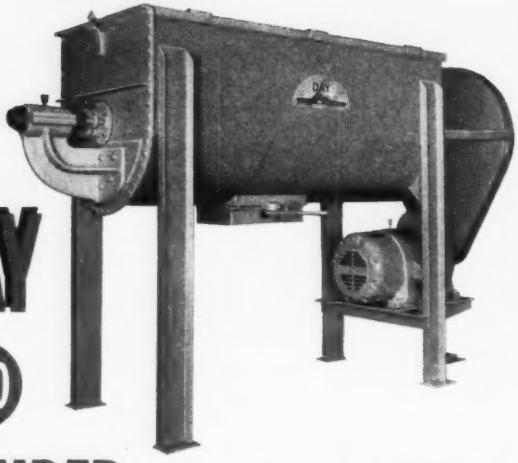
For more information, use post card on last page.



Powders Pastes



or Liquids



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D-10

BLENDER *does a finer, faster job!*

Whether you work with powders, pastes or liquids, you can depend on a DAY D-10 BLENDER to boost production. Scientifically designed agitators insure constant, thorough blending action. Sturdy outboard bearings provide ample support for the agitator shaft, remain free from abrasive action by the material being mixed and also eliminate bearing loads on the stuffing boxes. Heavy-duty design includes a rigid frame that is free from vibration, plain or stainless steel tank and a geared head motor with roller chain drive. Discharge at center or either end is optional. Available with Spiral Ribbon Agitator for paste, semi-paste, granular or liquid products.

DRY COLOR AGITATOR

Optional, supplied when necessary for materials such as heavy-bodied powders.

Call your J. H. Day Sales Engineer or write for details. The J. H. Day Co., Inc., 1146 Harrison Ave., Cincinnati 22, Ohio.

DAY

THE J. H. DAY COMPANY, CINCINNATI 22, OHIO

Frozen Mexican Foods

From traditional recipes, Ashley's Restaurant & Mexican Foods, El Paso, Tex., is preparing, freezing, and marketing three savory Mexican dishes —Chili con Queso, Chili Rellenos, and Chili con Carni.

These products are packed in aluminum trays, frozen and overwrapped with three-color-printed cellophane. The wrap carries an illustration of a colorful dancing senorita, providing an attractive sales-appeal package.

To prepare these items it is necessary only to heat and serve.

Wrap is Cellulin, which is printed by Shellmar Products Corp., Mount Vernon, Ohio, in its South Gate, Calif., plant.

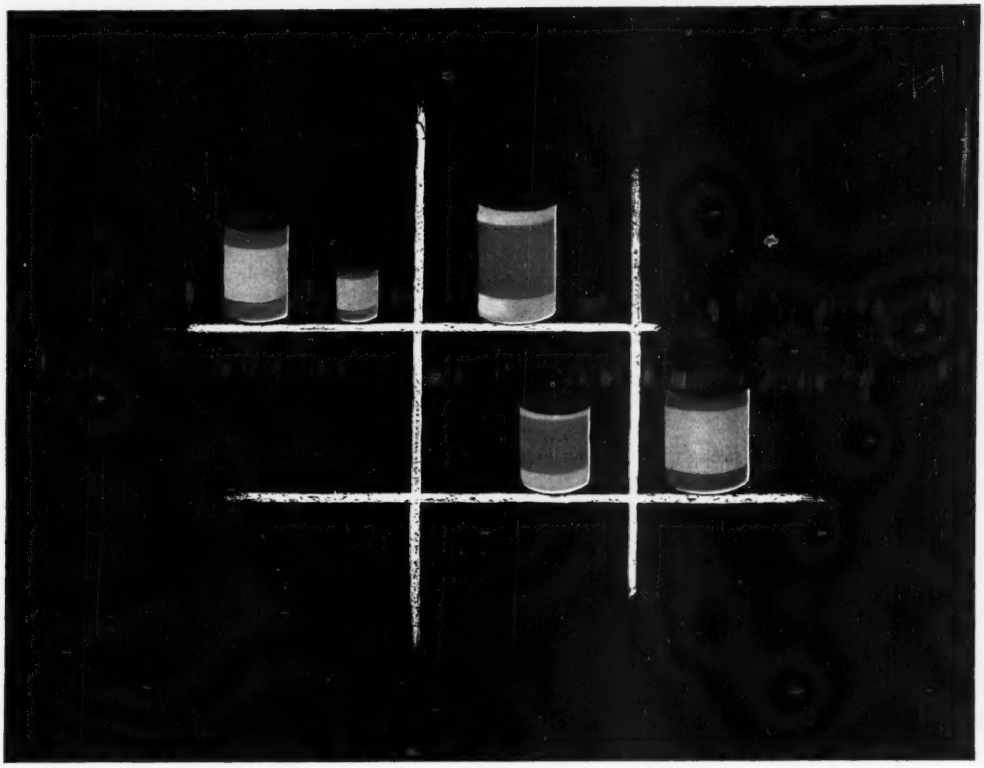
For Package Data Use Reader Service

Individual Comb Honey

Comb honey in approximately 2½-oz. portions is now being attractively packaged by Champlain Valley Apiaries, Middlebury, Vt.

The cellophane wrapped honey is placed in a chipboard carton with a cut-out front, making the product clearly visible.

The carton is designed in red and pale green on a white background, with a design of clover blossoms from which the honey is made.



Canners Are Sold on *SUGAR!* as a Selling Aid!

Why do most canners use sugar—and *only* sugar—in their packs?

One reason is the long-established superiority of sugar as a sweetening agent. Another reason for all-sugar packs is that sugar is the only sweetener which can be used alone in a wide variety of packs.

Sugar is economical. It gives you 10 to 50% more sweetening power. Sugar is easier to use. It requires no special handling or storage.

Sugar-sweetened packs taste better, keep better, sell better. Specify *sugar*. Make *quality* a *certainty!*

SUGAR
INFORMATION INC.
NEW YORK 5, NEW YORK

Introducing a New, Rugged All-Crinkled Bag

TUFPAK®

Here's a really tough multi-wall bag that will protect your product and save you money. Consider these TUFPAK features:

- 2 to 6 plies extra-strong crinkled kraft paper.
- Made to order in any combination of plain . . . wet-strength . . . wax-treated . . . waterproof . . . mesh-reinforced . . . or polyethylene coated plies. Polyethylene liner also available.
- The *only* all-crinkled bag supplied in 10″ to 44″ widths.
- Resilient and flexible—absorbs shock, rough handling.
- Creped surface takes slip and slide out of stacking.

TUFPAK—the ideal shipping container for chemicals, foods; powdered, granulated, or crushed products.

NATIONAL WATERPROOF PAPERS, INC.

Manufacturers of Protective Papers, Liners and Bags Since 1903

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Send coupon below for sample bag and complete information

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Please send me a sample bag and full details on TUFPAK as indicated below:

Product to be packed .....

Size of Bag ..... Wt. of Contents .....

Company .....

Address .....

.....

Individual .....

(Please Print)

NATCO

Reg. Pend.

Candy in Window Pack

A new style carton is being used by National Licorice Co., Brooklyn, for its licorice candies. Not only is easier packaging attained by use of this pre-glued type of folding carton but the ample window especially lends itself to "visible merchandising" due to the gay colors of the candies. The carton is printed in multi-colors.

The package was designed by the supplier of the carton—Eastern States Carton Div., Robert Gair Co., Inc., New York City.

For Package Data Use Reader Service

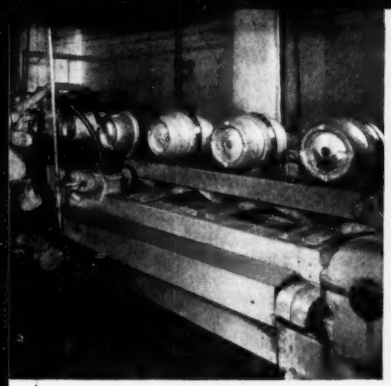
Peanut Butter With Jelly

Two popular "go-togethers"—peanut butter and jelly—are combined in a single spread that Major Brands, Inc., Western Springs, Ill., is marketing under the "Majorette" label.

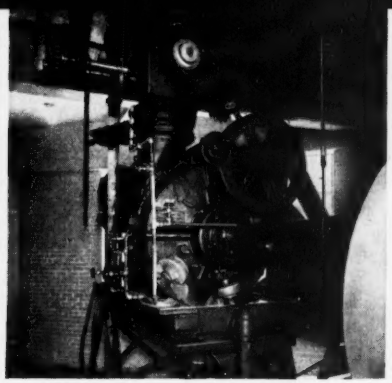
The combining process was developed after considerable experimentation. First grade peanuts and grape jelly are used in making the product. It has the consistency of apple butter, and preliminary test marketing indicates its popular acceptance.

Jars are supplied by Owens-Illinois Glass Co., Toledo, and caps by Swan Cap Co., Chicago.

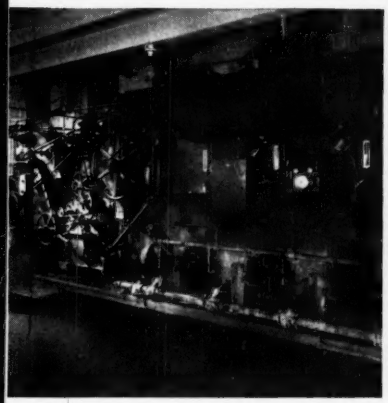
For Package Data Use Reader Service



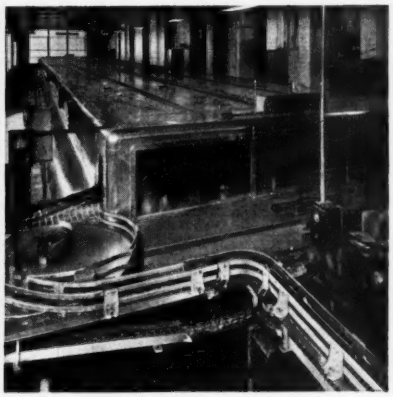
Keg scrubber – A constant stream of water at 130°F. plays over these barrels and reaches bearings on conveyor.



Wet-grain press – After being heated to 180°F., grain is then pressed dry. Hot water comes in contact with bearings.



Bottle soaker and washer – Bottles are first cleaned with strong alkali at 180°F., then washed with water. These conditions make bearing lubrication difficult.



Pasteurizer – Beer is pasteurized in this modern machine which is subjected to constant water spray ranging from 80°F. to 140°F.

No trouble brewing for bearings!

A midwest brewing plant employed seven different greases in a variety of applications. Despite the use of these special products, the operators experienced difficulty. The greases would not withstand both water and high temperatures. Frequent applications were necessary.

A Standard Oil lubrication specialist was called in on this problem. Upon his recommendation, STANOLITH Grease – a lithium-soap product with the ability to withstand both heat and water – was given the job.

As a result, STANOLITH has replaced all seven greases formerly used and *has done a better job in each type of application.* Through its use over a two-year period, grease consumption has been reduced 20% and time spent in applying grease cut 50%.

STANOLITH Grease can prove its remarkable versatility in your plant, too. Its high mechanical and chemical stability plus its extreme resistance to heat and water qualifies it to replace a variety of special greases.

STANOLITH
TRADE MARK
Greases

To obtain maximum benefits from STANOLITH, use the services of a Standard Oil lubrication specialist. His headquarters are near your plant. How you can benefit by his on-the-spot service is explained at the right. Standard Oil Company, 910 South Michigan, Chicago 80, Illinois.

What's YOUR problem?

Mr. D. V. Wills of Standard Oil's South Bend office is the lubrication specialist who helped this Midwest brewing company solve a difficult lubrication problem.

He is one of many Standard Oil specialists located throughout the Midwest. These men have the practical experience and special training to handle lubrication problems on any type of operation.

Take advantage of the service offered by the lubrication specialist nearest your plant. You can reach him by phoning your local Standard Oil Company (Indiana) office. Why not call, today, and arrange to discuss with him the advantages offered you by STANOLITH and other outstanding products such as:

STANOIL Industrial Oils—This general-purpose line of oils provides cleaner operation of hydraulic units and supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of specials oils and lubricants.

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types, SUPERLA Greases cover a wide range of applications. These efficient products are comparable in quality with the highest type of special greases.

STANORUST Rust Preventives—The eight grades of STANORUSTS form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically developed for its intended use. The grades range from a fingerprint remover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

CLEAN UP
WITH
KLENZADE
DETERGENTS
AND
SANITATION
CHEMICALS

KLEER-MOR
Popular wetting agent detergent for all hand cleaning jobs in the food industries. Rapid detergent and emulsifying action.

KLENZADE X-4
Concentrated powerful liquid-type sodium hypochlorite disinfectant and germicide. Ideal for food plants. Leaves no film.

STER-KLEEN
Organic acid detergent compatible with all quaternaries. Removes lime film and alkaline deposits from equipment.

STER-BAC
An outstandingly powerful quaternary for sanitizing food plant equipment and preventing mold growth.

Offices in Principal Cities
A Klenzade field technician will gladly call and help you plan a complete plant and equipment cleaning program.

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BELOIT, WISCONSIN

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Two Food Empires

—*Continued from page 91*

In the bakery field, the growth of George Weston Ltd., and Weston's purchase of other companies in Canada have brought answering competition in the form of expansion by Weston's nearest Canadian rival, Christie Brown Ltd., a subsidiary of American National Biscuit Co. Also, a new English company has come to Canada—Peak-Freen Ltd.

And in the wake of Taylor's development of his Canadian Breweries Ltd. and his promotion of the United States of American Brewing Corp. have come increased beer sales in Canada, creation of more retail beer outlets, and expansion by competing breweries.

Also, word came as this article was being prepared that Taylor has just formed a British company to brew Canadian beer at Sheffield.

In the retail field, Weston operates a chain of grocery stores in Western Canada, through his wholesale house, Western Grocers Ltd., Winnipeg. He also has a big holding in Loblaw Groceterias Ltd., Toronto, largest of Canada's chain grocery systems, which did $125,000,000 in sales in Ontario last year. This chain has been expanding rapidly with supermarkets in Ontario, while its affiliate in upper New York State and Pennsylvania has also been growing.

Meanwhile, Taylor owns a big part of Dominion Stores Ltd., Toronto, which operates grocery supermarkets and groceterias east of the Manitoba-Ontario border to the Atlantic Ocean. This is considered the second largest such chain in Canada based on volume of business ($74,000,000 in '51).

Costs Zoom

Food costs have been climbing rapidly in Canada since 1945. Price control during the war years kept the increase close to the base period of 1939. Canada went on price control in mid-1941.

Taking 1939 as 100, the food cost-of-living index had reached 218 by end of 1950, and by end of 1951 stood at 249.3, according to the Dominion Bureau of Statistics. Early in 1952 food costs had gone down a little in some commodities, and a general leveling off was anticipated.

Especially in conjunction with the industries of Weston and Taylor, it is of interest to note that official figures show the wholesale price index of bakery products moving from 97.2 in 1939 to 161.7 in 1950 and 176.4 at end of 1951; sugar and its products moving from 107.7 in 1939 to 202.9 in 1950, to 230.6 in mid-1951, and 204.8 in November 1951; and grains going from 70.5 in 1939 to 209.3 in 1950 and 223.2 at end of 1951.

Food prices in general in 1951 were up about 15 percent over 1950, largely due to increased manufacturing costs. It has been estimated that the total Canadian food business ran to $1,350,000,000 last year.

Both Weston and Taylor have also taken time out for public service. The former was a member of Parliament in Great Britain during the war years, while the latter headed the British-Canadian supply council at Washington during World War II.
End (*Resume reading on page 92*)

Schraffts' Does It Better

—*Continued from page 91*

off at intervals and hand-fed to five wrapping machines.

If bar goods are coming through, then a by-pass belt is lowered over the quarter-turn conveyor. Bars next continue to a second quarter-turn belt and onto another inclined conveyor that feeds them to wrapping machines parallel to the patty line.

From wrappers, bars and patties are delivered to the opposite side of 32-in. wide belts, where they are packed into cartons. Empty cartons are conveyed from balcony storage to the packaging lines. Packed cartons are placed on belts below the packing conveyors and delivered to cellulose-tape sealers and X-ray machines. When an operator inside an X-ray unit spots foreign objects in any of the candies, an alarm is sounded, the line is stopped, and the candy rejected.

From here, cartons are moved by belts and gravity-roll conveyors to another packing station, where they are loaded into shipping cases. Aiding the packers at this point are specially designed tables with small ball bearings. Cases easily ride over these bearings as cartons are packed into them, ready for delivery to automatic case-gluers and sealers.

Three lines—mints, patties, and bars—converge by gravity-roller conveyors to an adjustable case gluer and sealer. Flow of cases from these lines is controlled by hand-operated switches that actuate metal stops mounted on each conveyor. Cases then travel to storage rooms—which have a capacity in excess of 12,000,000 lb.

Now let us see how the packaging department has been efficiently engineered to handle the large daily production of assorted chocolates.

These varied confections—chocolate-coated creams, nuts, marshmallows, caramels, and hard candies—are removed from plaques leaving the 4th-floor coolers and then deposited on conveyor belts. From these belts, one portion of the candies is bulk-packed in 5-lb. paperboard cartons, the other portion goes on wooden trays holding 6 lb. The 5-lb. cartons are string-tied and bin-conveyed to an X-ray machine.

Finally, the cartons are packed into shipping cases, which are roller-conveyed to automatic case-gluers and sealers. Flow of cases to the cold-storage room is by a system of chutes, gravity-roll conveyors, and belts.

Meantime, the trays of assorted chocolates are loaded into metal bins that are lift-truck transported to freight elevator and then to storage, ready for packaging into fancy boxes.

Efficiency and flexibility have been achieved on the new assorted-chocolate packaging lines. Flow of fancy boxes of chocolates is U-shaped. There are three 2-lane packaging lines, each equipped with an X-ray machine. Two of these lines are arranged for fancy-box double-wrapping, while the other is for single-wrapping. Thus, five automatic wrapping machines on the three lines handle the daily production.

All packaging lines consist of packing and wrapping stations, parallel to each other. Empty boxes are removed from cartons on the 3rd-floor mezzanine and separately belt-conveyed to each double-lane packing line to avoid congestion on the packaging floor. Covers meet filled boxes at the end of the packing lines.

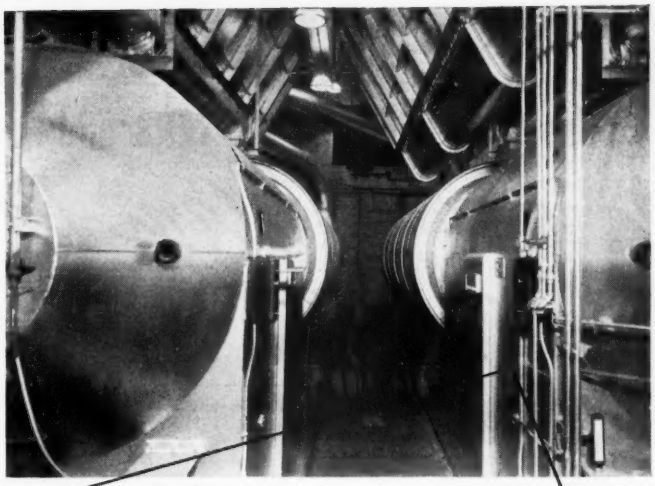
Covers are then put on the boxes, which continue through X-ray machines and then go by inclined, friction-belt conveyors to an overhead horizontal belt. At this point, the boxes make a right-angle turn and continue to chutes that feed them to wrapping, band-sealing, cartoning, and casing lines.

Meanwhile, empty cartons into which the fancy boxes are to be packed are conveyed by overhead belts from carton-opening stations on the 3rd-floor mezzanine to packing stations beyond the wrapping and band-sealing machines.

Flexibility is attained through the installation of two by-pass belts on each wrapping line. These belts can be automatically adjusted to by-pass the fancy boxes past a wrapping machine or a band-sealer.

Cartons containing fancy boxes are packed into shipping cases on ball bearing-top tables. Finally, cases are chuted from gluers and sealers onto gravity-roll spiral conveyors through an air-lock and to refrigerated storeroom.

End (*Resume reading on page 91*)



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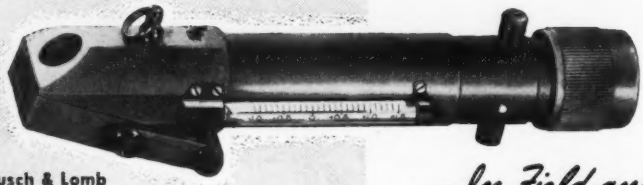

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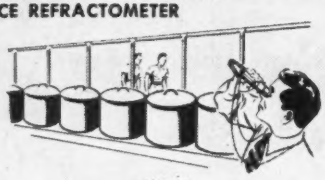

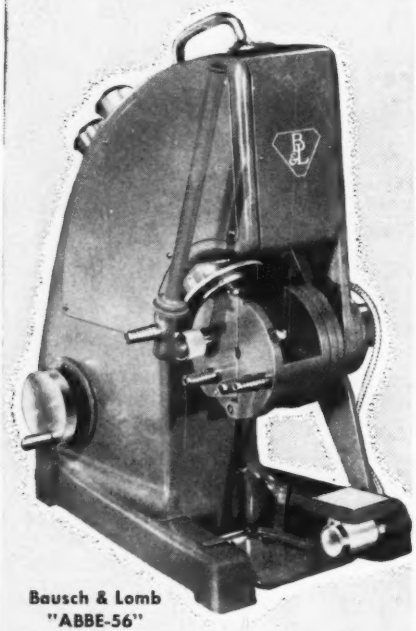

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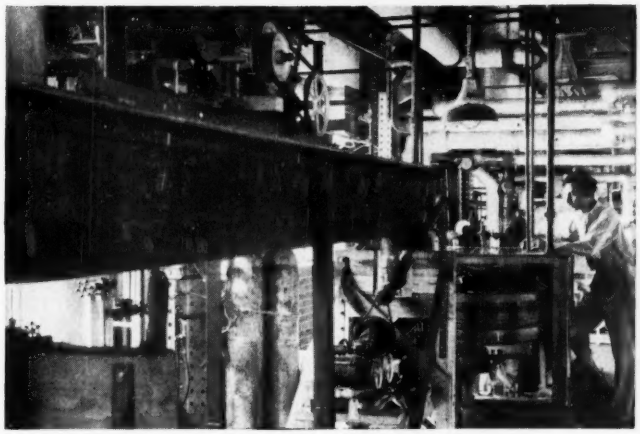
ADVANCES IN TECHNOLOGY



New, Continuous Solvent Extraction Process Produces Oil and Meal of High Quality

Continuous solvent extraction of oilseeds on a pilot-plant scale has been successfully accomplished at SRRL, using a 3-ft. dia. continuous, horizontal, vacuum filter. Runs have been made on cottonseed, rice bran, and soybean flakes at a rate of 24 tons per day. Hexane was used as solvent.

To attain this capacity, material fed to the filter must be properly prepared and conditioned. These operations require adequate rolling, moist cooking, and partial drying, followed by a granulating procedure to consolidate the fines into larger agglomerates.

The conditioned material is mixed with miscella (10 percent oil content) in a slurry-mixing-conveyor (top left in photo), where practically all of the oil goes into solution forming a concentrated miscella (about 30 percent oil). The slurry is then deposited on the filter where the concentrated miscella is separated from the meal by countercurrent displacement washing with commercial hexane.

During its stay on the filter the meal receives three countercurrent washes which reduce the residual oil content to 1 percent or lower. Extracted meal is discharged from the filter by means of a motor-driven scroll.

The preparation and conditioning operations can be carried out in conventional equipment employed in hydraulic and screw-press mills, with minor additions and modifications.

The slurry-mixing conveyor is simple in construction. It provides gentle agitation for 15-20 min., during which time practically all of the oil goes into solution.

The continuous filter (right) is a standard commercial unit and requires only a tight sheet metal enclosure to prevent loss of the solvent. The miscella is evaporated and stripped for oil and solvent recovery, and the solvent-damp meal is dried for solvent recovery in standard equipment.

Advantages of the process are: High quality of both oil and meal; low solvent requirement; low solvent content of final meal; low power consumption; low installation cost; possibility of complete mechanization with lowered supervising and operating costs; and use of conventional hydraulic and screw-press equipment without extensive modifications.

Digest from "Filtration-Extraction: A New Process for Recovering Oil from Oilseeds," C. A. No. 22, Southern Regional Research Laboratory, New Orleans 19, La., March 13, 1952.

Terpeneless Essential Oils

Fractional distillation or solvent extraction is often used to separate terpenes from essential oils to be used for flavoring purposes. And sometimes the flavor quality of the oil is affected adversely by the heating or incomplete terpene extraction.

Chromatography of eight essential oils on silicic acid gel, using hexane as a solvent, indicated that separation of the terpenes was essentially quantitative. The non-terpenes could be eluted from the silicic acid by ethyl acetate, acetone, ether, or other oxygenated solvents. They contained the oxygenated compounds in the oil while the hexane fraction contained only hydrocarbons.

Odor of the terpeneless fraction was more delicate and purer than the original oil, and was superior to commercial terpeneless oils, all of which showed considerable amounts of hydrocarbons. The method should be adaptable to commercial usage since the silicic acid can be reused by washing out the non-terpene eluting solvent with hexane, and repeating the adsorption with a new lot of oil.

Digest from "Preparation of Terpeneless Essential Oils. A Chromatographic Process" by J. G. Kirchner and John M. Miller, *Industrial and Engineering Chemistry*, 318-21, Feb. 1952.

Oxidation of Peppermint Oil

Peppermint oil undergoes flavor changes on aging that are mostly due to oxidation and in which acids, alcohols, and ketones are formed. And viscosity increase and oxygen uptake per 50 ml. were found to be good indexes of these changes.

Irrespective of origin, all oils underwent oxidation at measurable rates.

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However storage in full containers in the dark at below normal room temperature produced less flavor and oxidation change after 14 months than after 6 days at 50 deg. C. in the presence of air.

Fractionation to remove labile components such as limonene, pinene and aldehydes, has only a small effect on oxidation rate, while acidic contaminants greatly accelerate oxidation and alkalies have no significant effect. Copper and iron salts have little effect on the oxidation, while zinc salts seem to inhibit it. Oxidation in glass containers was slightly less than in galvanized iron, stainless steel or aluminum.

Of the active antioxidants tested (NDGA, alpha-tocopherol, Alcolec), NDGA-treated oil (0.1 percent) showed almost no oxygen uptake, though the other antioxidants also showed great improvement over the control sample.

Digest from "Oxidation of Peppermint Oil," by R. H. Reitsema and F. J. Cramer, *Industrial and Engineering Chemistry*, 176-80, Jan. 1952.

SANITATION

Mold Growth On Plant Walls

A well-hardened, glossy painted surface is a good inhibitor of mold growth on walls and construction surfaces. But obtaining such a surface without its gathering dust during the hardening period is difficult to accomplish in a factory during operation.

In trials conducted on raw wood surfaces, fresh and old paint, plaster over wood, natural red brick, whitewashed and cement-coated brick, and white flint bricks, mold growth was obtained above 70 percent relative humidity on all the surfaces except well-hardened fresh paint. The experiments were carried out in constant humidity chambers at 70, 80, 88, and 95 percent relative humidity, using species of *Aspergillus*, *Mucor*, and *Penicillium* molds. Natural wood surfaces (white pine) showed most growth at 80-88 percent R. H. Painting with a high gloss white lead-base paint did not inhibit growth as long as the surface was tacky, but after the paint had become well-hardened there was no growth during the 4-week test period over the whole humidity range. Brick surfaces support growth in relation to their porosity. Whitewashing stimulates growth but cement-coating seems to retard it slightly. White brick (flint, precast) though less porous than red brick, supports a heavier growth of molds. Smooth surfaces that do not collect mold nutrients in

the forms of dust and dirt are more resistant to mold than rough surfaces.

Digest from "The Effect of Humidity on Mould Growth on Construction Materials" by J. B. M. Coppock and E. D. Cookson, *Journal of the Science of Food and Agriculture*, 534-37, Dec. 1951.

CONFECTIONERY

Speedy Chocolate Analyses

Analyses of chocolate coating samples, using a centrifuge to make the separations of the solvents from the cocoa matter, have been used for 40 yr. or more. For example, in 100 ml. centrifuge tube, 10 g. of finely grated chocolate coating can be extracted 3 times with petroleum ether, the extract being separated each time by 5 min. centrifugings at 4,000-5,000 rpm.

After driving off the fat solvent, the defatted chocolate is extracted in the same way with three portions of boiling water. This extract is used for determining sucrose by polarization, and total soluble solids.

The water-insoluble in the centrifuge tube is washed into a moisture dish for determination of insoluble cocoa matter. A portion of the original chocolate is dried at the same time for a moisture determination. These operations yield figures for moisture, fat, sucrose, soluble, and insoluble cocoa matter by simple, quick methods. In twenty analyses reported, sums of the determinations amount to 99.65-100.9 percent of the original chocolate.

Digest from "Results Obtained by the Centrifugation Method of Chocolate Analysis" by J. Vollaire-Salva, *International Chocolate Review*, Jan. 6-7, 1952.

CEREAL PRODUCTS

Unifine Flour Particle Size Affects Digestibility

Previous work with Unifine flour demonstrated that fineness of grind improved the baking characteristics and palatability of whole wheat flour. In this study tests were made to learn the nutritive value of the proteins of Unifine flour, whether the Unifine product was more or loss digestible, and whether the thiamine was more available than in commercial whole wheat flour. Patent flours were also used in comparative tests, as were egg powder and casein. Rat diets were prepared from these and other materials, adjusted to contain 10 percent each of protein and fat. The rats also received 3 times weekly a complex vitamin solution. They were maintained on the diets for 6 weeks.

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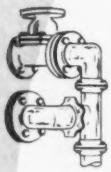

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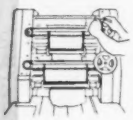

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In ability to support rat growth, Unifine held an intermediate position, being neither as good as egg powder and casein nor as poor as white and whole wheat flours. In digestibility, however, Unifine was lower than commercial whole wheat flour. Thiamine availability, as determined by the rat-curative thiamine assay method, appeared to be equally good in flours of several degrees of fineness.

Digest from "The Effect of Particle Size on the Nutritional Characteristics of Unifine Flour," by M. C. Stevens, J. F. Sieburth, T. Wahl, and B. McLaren, *Food Research*, 74-80, Jan.-Feb. 1952.

DAIRY

Antioxidants Protect Flavor Of Stored Frozen Cream

Summer and winter creams respond differently to attempts to control oxidized flavor in the frozen products. Ethyl caffeate and Sustane at 0.04, 0.022, and 0.002 percent levels on a fat basis, with and without 0.5 ppm. added copper, were used as antioxidants on summer cream. These and two additional antioxidants, Tenox II and Tenox BHA, with and without added copper, were used on samples of winter cream. Results of the tests showed that the antioxidants were effective in preventing the development of oxidized flavor for at least 6 months or longer in the absence of added copper. With copper, however, ethyl caffeate at the 0.04 percent level in summer cream was effective through 12 months, but ineffective in winter cream. None of the other antioxidants was effective beyond 5 months in presence of copper.

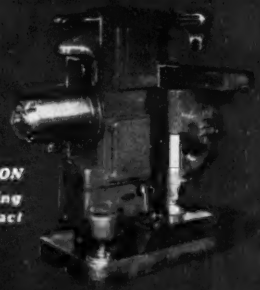
Digest from "Effect of Antioxidants in the Control of Oxidized Flavor Development in Stored Frozen Cream. I. Use of Ethyl Caffeate, Sustane, Tenox II, and Tenox BHA," by A. J. Gelpi, Jr., L. L. Rusoff, and R. D. Skole, *Journal of Dairy Science*, 93-97, Feb. 1952.

Single Reagent Test For Quat Solutions

A simple method has been devised for colorimetric differentiation of quaternary ammonium solutions of 200 ppm. from weaker ones by means of a single reagent.

Composition of the reagent (percent by weight): Bromphenol blue, 0.08; C. P. sodium acetate, 12.50; glacial acetic acid, 62.50; distilled water, 24.92. Solution is prepared by dissolving bromphenol blue in a mixture of the acid and water and then adding the acetate salt.

To perform the test, 0.40 ml. of the reagent is added to 6.0 ml. of the quat. solution in a vial. Upon shaking the mixture, a clear blue color ap-



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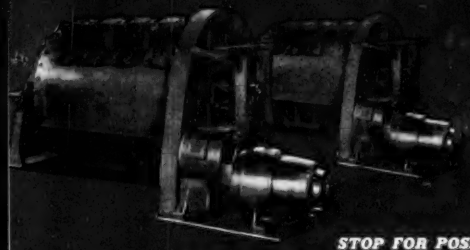
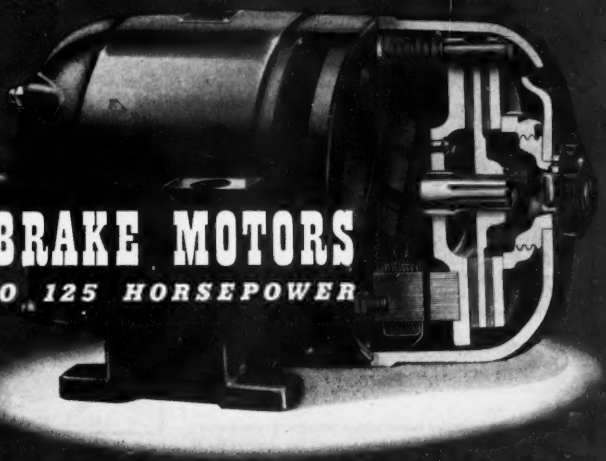


STOP FOR POSITION
Stop at the desired point for quickly and conveniently loading and unloading



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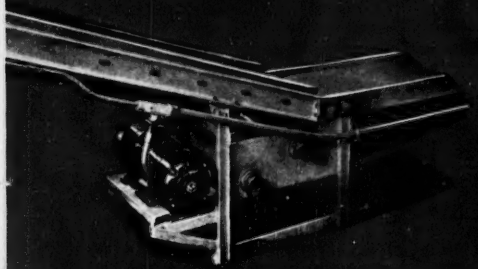

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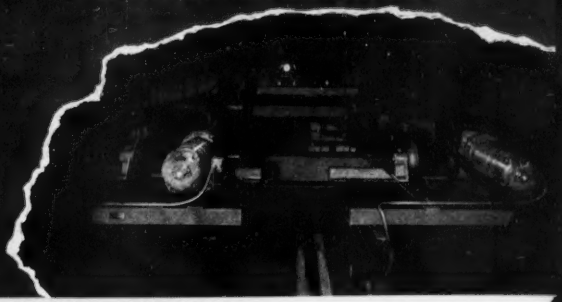

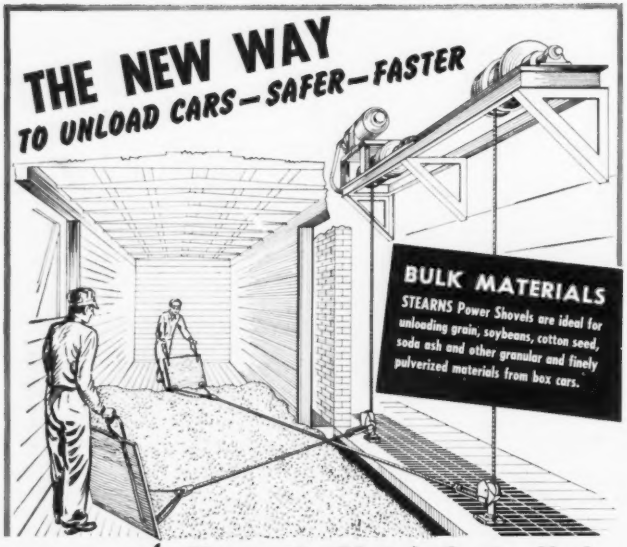
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BULK MATERIALS
STEARNS Power Shovels are ideal for unloading grain, soybeans, cotton seed, soda ash and other granular and finely pulverized materials from box cars.

Stearns Magnetic Clutch Controlled
POWER SHOVELS
PATENT PENDING

SAVES MEN

Using the STEARNS Power Shovel means safer unloading, for the moment the operator releases his pressure on the "dead-man" switch, the scoop stops! Thus injuries resulting from the operator being thrown over the board are eliminated. If the operator's leg is caught in a loop of the cable, serious consequence is avoided as the scoop automatically stops when the safety stop trips the limit switch.

SAVES TIME

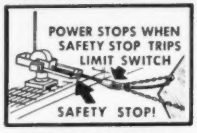
Cars can be unloaded faster with a STEARNS Power Shovel, for the operator does not have to wait for slack cable to be overhauled on short strokes. The scoop can be started or stopped anywhere — less time is spent in cleaning up the car.

SAVES MONEY

With the control in the hands of the operator, unloading time can be cut up to 30%. This means lower direct labor costs for unloading each car and that more cars can be unloaded each day. As the man in the car completely controls the scoop, labor costs are further reduced — no man is needed outside the car to manipulate weights. Learn how STEARNS Power Shovels can save you men, time and money — write today for specifications and prices.

SAFE

EXTRA SAFE



STOPS THIS!

AND THIS!

Foremost in the Magnetic Field
Stearns MAGNETIC INC.
667 South 28th Street Milwaukee 46, Wisconsin

pears when the solution contains more than 200 ppm. quat. (the commonly recommended sanitizing strength). A blue-green, green, or yellowish color indicates less than 200 ppm., 100 ppm. or less, and 50 ppm. or less respectively.

Digest from "A Single Reagent Field Test for Quaternary Ammonium Solutions," by D. B. Conklin, *Journal of Milk and Food Technology*, 27-28, Jan.-Feb. 1952.

FRUITS AND VEGETABLES

Citrus Fruit Flavor

Adding prepared rind to the juice of citrus fruit in order to obtain true flavor, and subsequently quick-freezing the resulting product, is the basis of a patented process.

In accordance with the invention, whole fresh fruit is grated to separate the finely comminuted rind from the flesh. Sugar is added to the rind in equal proportions by weight, and the mixture is allowed to stand for one hour. It is then combined with the juice obtained from the fruit in the proportion of about 1 lb. of sugared rind to 2 qt. of juice. After thorough mixing, product is quick-frozen for storage and shipment.

Digest from U. S. Patent 2,578,915, issued Dec. 18, 1951, on an application dated Oct. 8, 1949, to John Bartels, Dobbs Ferry, N. Y.

Nutrients and Vitamins Lost In Shipping and Storage

Fall in asorbic acid content is one of the best indexes of damage to fresh fruits and vegetables. This is because it is easy to determine, and also because damage by enzyme activity is less rapid. Fresh produce showing little ascorbic acid loss is therefore unlikely to be impaired in other respects.

Leafy vegetables may lose up to 50 percent of their ascorbic acid unless refrigerated promptly after harvest. Cabbage is an exception, in that even at ordinary temperatures its loss of ascorbic acid is very slow. Fruits are more stable, partly because of their acid cell sap.

Enzymatic changes follow rapidly if leafy vegetables are chopped or bruised. Cabbage ground to a pulp loses its vitamin C in less than 5 min., and broken spinach leaves may have 60 percent as much ascorbic acid as unbroken leaves.

Fruits and solid vegetables suffer other kinds of damage from bruising —browning is example. Freezing that results in cell rupture can cause heavy losses of ascorbic acid. Sweetening of potatoes stored at too low temperatures is a well-known form of dam-

West Carrollton GENUINE VEGETABLE Parchment

Gives Good Protection, too!

Fine foods deserve the *best* flavor-protection that packaging can provide. That is why so many packers of moist foods use so much West Carrollton Genuine Vegetable Parchment, year after year—thereby winning quicker and more lasting public acceptance. This parchment is ODORLESS, TASTELESS, GREASE-RESISTANT, INSOLUBLE and is STRONG, too, wet or dry. We can print it for you in one or more attractive colors (special inks)—right to your specifications.

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LASTS LONGER
"Our plant really puts out big production and those sleazy little conveyor belts that are always fraying, tearing, stretching and giving up the ghost right in the middle of our busiest time, gimme a pain in the neck. It's bad enough to have to pay for a new belt, but what it costs us in 'down-time' for the change-over really scorches me. That's why I'm sticking with Buffalo Belts . . . they're TOUGH and can really take a beating."
Needless to say, this was a tough customer for us to sell originally, but he's typical of a good many customers who now swear by Buffalo Belts. We told him that our belts are MADE TOUGHER by taking the strongest, sturdiest cotton yarn available and WEAVING IT TIGHTER with our exclusive WOV-IN-WEAR process. From our more than 50 years of experience, we have designed a new kind of loom that permits us to weave under HIGHER TENSION and, naturally, this combination produces conveyor belts that are tougher and LAST LONGER. We told him all this and he said: "Prove it". So . . . we did! We'd like to do the same for you. How about it? Buffalo Belts are available in over 200 sizes, 35 widths, 7 thicknesses and 7 special surface treatments.
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209 CHANDLER STREET BUFFALO 7, NEW YORK
NEW YORK PHILADELPHIA CHICAGO DETROIT SAN FRANCISCO

age; their flavor can be restored by transferring to a higher temperature room. Storage in retail markets is part of the problem, and fruits and vegetables purchased from stores with a rapid turnover are usually superior in ascorbic acid content. Storage does not seem to condition fruits and vegetables so that cooking increases nutrient losses, the percentage losses being about the same regardless of the length of time they have been stored.

Digest from "Factors in Distribution Affecting the Quality and Nutritive Value of Food-stuffs. Loss of Nutrients During the Transport and Distribution of Fruits and Vegetables" by L. W. Mapson, *Chemistry and Industry*, Jan. 12, 25-28, 1952.

CANNING

Flash Sterilizing Tomato Juice Does Not Impair Its Color

Investigation has proven that tomato juice can be flash-sterilized as insurance against spoilage without danger of adversely affecting its color. The proviso is made, however, that close control must be maintained with respect to flow rates, temperatures, and holding times, so that the resultant time-temperature relationship for a particular unit does not exceed the sterilizing value necessary to destroy *B. thermoacidurans*.

The study was undertaken as a result of three reports from widely separated geographical locations that the color of flash-sterilized tomato juice was inferior to that of juice processed in the conventional manner. The reports show that in all instances the raw product was of borderline fancy quality.

The flash-sterilized juice failed to meet Grade A color requirements immediately after canning, whereas conventionally processed juice did meet them. But upon regrading several weeks later, the flash-sterilized juice met Grade A requirements, and there was little difference in the colors of the juices processed by the two methods.

Conclusions, based on the investigation were: (1) There are no color differences between samples of juice flash-sterilized at different temperatures (250-270 F.) when equivalent sterilizing values are used, irrespective of original grade; (2) There is no indication that conventionally processed juice is superior in color to the flash-sterilized product when sterilizing values used for the flash process are equivalent ($F_o = 0.7$) and do not exceed the heat treatment necessary to destroy *B. thermoacidurans*, and (3) Processes with sterilizing values in ex-

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cess of 0.7 do impair the color of flash-sterilized juice.

Digest from "Effect of Sterilization Temperatures on Color of Tomato Juice," by T. E. Blumer, F. W. Parrin, and G. T. Peterson, *Bulletin* No. 28, 1952, Research Div., Continental Can Co., Inc., New York City.

MEATS AND FISH

Improved Smokehouse

Apparatus has been patented comprising a smokehouse, smoke generating unit, heating section, and combustion chambers for gaseous fuels, together with auxiliary fans and thermostats, for the controlled smoking and tenderizing of meats such as hams.

In operating the apparatus, products to be treated are placed in the smokehouse compartment, and a receptacle in the generating unit is filled with wood chips, shavings, or sawdust. Smoke generated, when the latter is heated, is drawn into the treating compartment, thence into the heating compartment and back to the smokehouse. Smoke and heated air are thus continuously cycled while additional smoke is being added to the flow. Constant temperatures are thermostatically maintained in the smokehouse, initially at a low temperature and later at a high temperature, and smoke generation is maintained at a constant rate. Under these conditions the meat is simultaneously smoked and tenderized.

Digest from U. S. Patent 2,576,925, issued Dec. 4, 1951, on an application dated Dec. 4, 1948, to Clyde E. Dillon, assigned to Raymond H. Starr, Kansas City, Mo.

BEVERAGES

Maturation of Beer

Beer is aged for removal of the "young beer bouquet", but it should not be overdone since long storage causes loss of character and aroma and development of a vinous quality which is not always pleasant. Pale beers, especially those made with delicate hops, tend to lose their fine bitter taste, and to take on a coarse quality.

Clarification occurs during storage and is, in part, a function of the surface areas in contact with the beer. Therefore, it matures better in small tanks than in large ones. In the latter, addition of wood chips, aluminum turnings, or materials such as "biospane" promote clarification. Complete separation of yeast is desirable, but too prompt a settling, followed by autolysis, can cause higher pH, re-

Let's get down to "brass tack" facts about

CHEVROLET

Advance-Design TRUCKS

CHEVROLET first in demand in value in sales

Fact No. 1

YOU PAY LESS TO BUY!

Get the price on the Chevrolet truck that's the right size, type and capacity for your work. You'll find that it lists for less than any other truck capable of doing the same job. Chevrolet has the lowest priced line in its field.

Fact No. 2

YOU SAVE ON COST PER MILE

You can't beat Chevrolet's Valve-in-Head engine for over-all economy—fuel, oil, upkeep. It just keeps rolling along. And extra-rugged frame, hypoid rear axle, and Flexi-Mounted cab mean longer life, lower maintenance.

Fact No. 3

YOU GET THE RIGHT TRUCK FOR THE JOB

No truck is worth the price if it doesn't get the job done—fast and sure. Chevrolet trucks are *factory-matched* to the payload, *factory-matched* to the job. There's a standard body and chassis, or chassis for special body, that's just right for your work.

Fact No. 4

YOUR TRUCK INVESTMENT IS SAFER!

Comes time to trade in an old Chevrolet truck for a new one, here's good news: Year after year, used Chevrolet trucks traditionally bring more money compared to what they cost, than other makes. The demand is there, because Chevrolet trucks stand up better.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

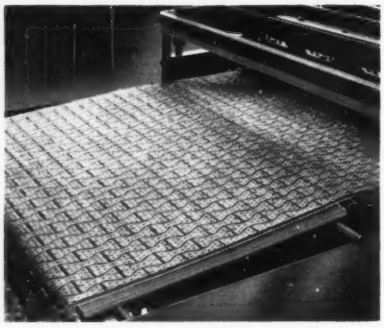
TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

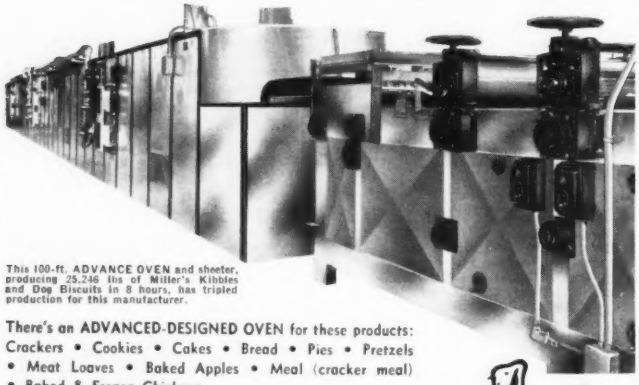
CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

ADVANCE OVEN

Triples

DOG BISCUIT PRODUCTION FOR BATTLE CREEK DOG FOOD CO.





This 100-ft. ADVANCE OVEN and sheeter, producing 25,246 lbs of Miller's Kibbles and Dog Biscuits in 8 hours, has tripled production for this manufacturer.

There's an ADVANCED-DESIGNED OVEN for these products:
Crackers • Cookies • Cakes • Bread • Pies • Pretzels • Meat Loaves • Baked Apples • Meal (cracker meal) • Baked & Frozen Chickens

CHECK THESE ADVANCE FEATURES:

- **Controlled Top & Bottom Heat.**
- **Recirculated Heat.** Gases are recirculated over and under product.
- **Direct or Indirect Fired.** With gas, oil or electricity.
- **Porcelain, Stainless Steel, Aluminum Exteriors.**

Our many years' experience—devoted exclusively to the problems of oven construction, heating, burner and temperature control, handling, supporting and cooling of food products—enable us to custom-build an Advance Oven—designed to solve your particular food processing problem with the greatest efficiency within the space available.

We build ovens for drying, heating, baking, toasting and sterilizing . . . for batch or continuous operation. Also conveyors and cooling systems.

FREE TECHNICAL SERVICE
Send us details of your food processing problem. Also a rough floor plan of your plant. Our engineers will make specific recommendations, without obligation.

ADVANCE

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OVEN COMPANY

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Western States Office: 11941 Wilshire Blvd., Los Angeles 24, Calif.
Manufactured in Canada by Fort Engineering & Sales LTD., Montreal

dissolve precipitated tannins, and contribute acrid, bitter, foreign tastes to the beer.

Removal of CO_2 formed in the primary fermentation is important, since it carries with it amyl, isoamyl, butyl alcohols, acetic, butyric, caproic and sulfurous acids, hydrogen sulphide, ammonia, trimethylamine, and organic aulphides. If this gas is to be used for carbonation it must be purificed. During maturation more of these volatile substances are eliminated and others are esterified and modified to produce a more harmonious flavor balance.

Colloidal stability is important if beer is to be brilliantly clear in the glass. Betaglobulin elimination in the kettle, thorough separation of fine trub by filtration or centrifugation, low temperature fermentations, low temperature storage under CO_2, sharp filtration of beer at 0 deg. C., and the use of enzymic chill-proofing agents, are methods of achieving a colloidally stable beer.

Digest from "The Maturation of Beer" by Frank Gaeng, *L' Echo de la Brasserie*, 1193-99. Nov. 30, 1219-23, Dec. 7, and 1243-48, Dec. 14, 1951.

Faulty-Capping Detector Stops Hooding Unit

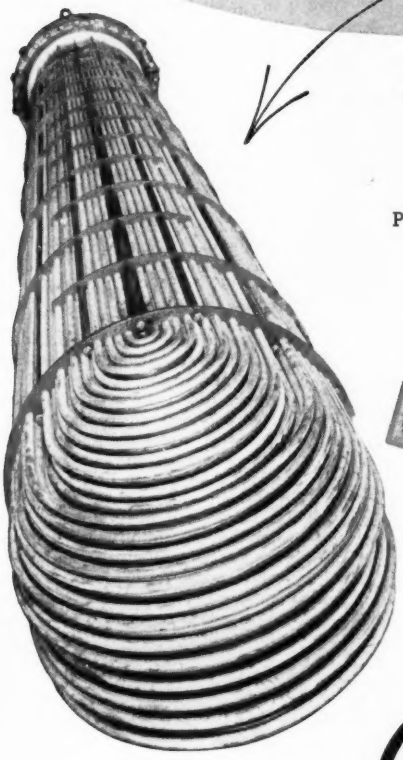
Modification of standard bottling equipment to insure detection of broken or improperly capped bottles and subsequent stopping of the machine is described in patent specifications.

Invention resides in the addition of two electric circuit controllers in timed correlation with each other. One is associated with the turret through which filled bottles pass to be capped, and the other with a shaft driven by a motor that also drives the turret. The controller for the turret carries a magnet (either permanent or electro) arranged to close the circuit each time a properly capped bottle passes it. The other controlling mechanism opens the circuit each time a bottle reaches the detector station on the turret.

The arrangement is such that during proper operation of the machine, one of the parallel-connected switches in the circuits is always closed. As long as capped bottles pass the detector station in sequence, the switches open and close at recurrent staggered intervals to secure continuous operation of the motor. The latter is stopped through the action of the detector when the turret circuit switch is kept open by an improperly capped bottle.

Digest from U. S. Patent 2,579,404, isued Dec. 18, 1951, on an application dated Nov. 15, 1948, to George M. Stevenson, Baltimore, Md.

Bending and rolling-in go like a breeze with *Carpenter* Stainless Tubing



Thousands of feet of ⅜" O.D. x 16 gauge Carpenter Stainless Tubing are handled by this fabricator. And the uniformly easy way the tubes respond to fabrication gets important process jobs started on schedule.

When your work calls for Stainless Tubing or Pipe, it will pay you to call your nearest Carpenter Distributor. He can give you the kind of help that keeps essential production going.

BENDING and COILING Slide Chart...

Part of Carpenter's service to help you conserve critical materials is this Slide Chart for Stainless Tubing and Pipe. It gives bending radii and coil diameters for various sizes and gauges. A note on your company letterhead will start this Carpenter Slide Chart on its way to you.

THE CARPENTER STEEL COMPANY

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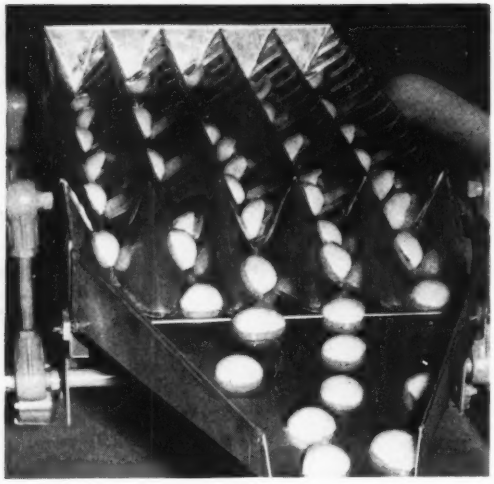

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PEACH PROCESSING EQUIPMENT

SAVE FOUR MANUAL OPERATORS on the average installation of Dudley positive-turning peach cup-up and cup-down units. Continuous high-speed fully automatic operation through stainless steel channels eliminates manual turning of fruit, provides faster, more accurate processing. Save on apricot and pear processing, too, with these and other Dudley machines.

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Machinery Corporation
MOUNTAIN VIEW, CALIFORNIA

MANUFACTURERS OF:
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Old-Time Quality

(*Continued from page 96*)

charge end. Baking time is approximately 17 min.

A master checking of baking temperatures is furnished by a multiple-record Leeds & Northrup potentiometer, which is mounted on a panel at the discharge end of the oven. Temperatures from thermocouples in 14 locations throughout the oven are automatically recorded by the instrument's print wheel.

Baking time is also recorded by the print wheel. Measurement of time is accomplished by the action of a tachometer generator—directly coupled to the oven drive—which is tied into the instrument measuring circuit.

Registering of the instrument print wheel occurs every 57 sec. Repeated reading of temperature at any location is provided four times per hour and of baking time eight times per hour.

Since production at the plant is "around the clock," this never-ending potentiometer record offers a very useful check. Also, frequent reference to baking time readings allows the attendant to correlate the Reeves drive setting that governs oven speed for desired biscuit quality.

Relight and Safety

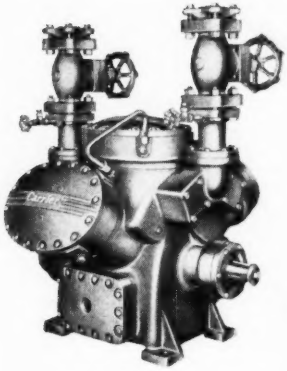
Another interesting oven feature is its repetitive relight system that prevents any hazardous accumulation of combustible gas. Each burner is equipped with a spark plug which, by means of a motor driven distributor, flashes every 18 sec. The same spark plugs also serve to light each burner when the oven is started up.

Oven start-up is initiated by a pushbutton control, which actuates exhaust fans in the oven stack. These fans operate for a 3½ min. period to purge the system before the ignition switch is pushed. The latter starts the burner plugs sparking and also energizes the solenoid valve on the main gas line.

All oven controls are interlocked. If, for any reason, the band stops moving, the solenoid on the gas supply line will automatically close. This not only prevents the product from burning up but also protects the $2,000 Swedish steel band, which could warp if held stationary in excessive heat.

Tribute to the engineered control that has been integrated into these ovens is their performance for 14 years without ruining a band or batch.

Both the oven attendant and the control laboratory keep a constant eye on the product as it comes from the



Carrier Ammonia
Reciprocating Compressor

How do valves travel in a modern ammonia compressor?

. . . on cushions. An exclusive feature on our modernized line of ammonia compressors traps part of the gas behind the valves to cushion their opening. This cushion-smoothness for valves means quieter operation and longer valve life.

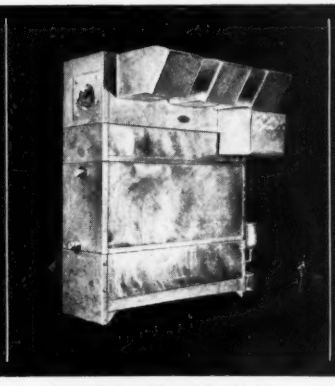
Another important item in Carrier's new line is the aerodynamic design of all the gas passageways, valve ports and valve discs to produce high efficiencies and low operating costs . . . at *all* loads.

New features like these plus a rugged streamlined crankcase, laid out to make all wearing parts easily accessible, create a heavy-duty compressor with minimum weight and space requirements. Foundations are less expensive. There's greater flexibility of location with respect to refrigeration load. Less piping is required and installation is easier, with reductions in hauling, rigging, and other labor costs.

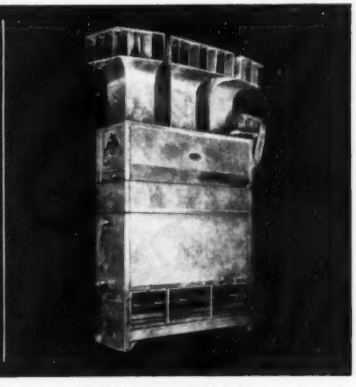
And to keep maintenance costs down, all parts are precision-made, renewable and interchangeable with a minimum of down-time, requiring no special tools or skills. Write for literature on the Carrier Ammonia Compressors. Carrier Corporation, Syracuse 1, N. Y.

Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING



Carrier Ammonia Evaporative Condenser



Carrier Ammonia Cold Diffuser

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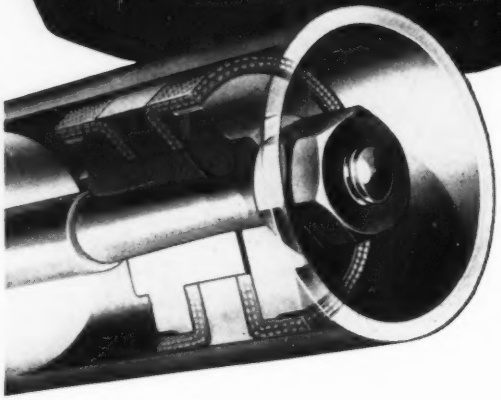
YOU GET
higher efficiency
WITH DARCOVA PUMCUPS
ON THE JOB!



THERE are two basic, well-proved reasons why more and more Darcova Pumcups are going into cylinders of air and hydraulic controls and mechanisms.

First, texture-engineered Pumcups outlast most other piston packings at least 3 to 1. There's less replacement, less down-time!

Secondly, efficiency *does not diminish* as Pumcups wear. Response is always faster, surer, with less power consumed!

Darcova Pumcups are available in sizes and engineered textures ideal for virtually any service. Why not find out what they can save *you?*

ASK FOR BULLETIN No. 4502

DARLING VALVE & MANUFACTURING CO.

Williamsport 20, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

oven. The former makes spotchecks on biscuit color and crispness and regulates oven speed and temperature accordingly. Also, the biscuit weight is frequently determined—variations being corrected by adjustments in the feed-in dough-sheet roller.

Finished biscuits also go to the laboratory for an air-oven moisture determination. Water content can also influence biscuit weight, which must be held at a standard ¼ oz. per wafer. Conformation of auger holes and embossing is also checked. And the tenderness and spring of the biscuit sample is judged.

Perhaps the most characteristic quality test of the product relates to this springiness. It is a factor depending upon the amount and shape of pores in the biscuit structure. If these are too open, the product may be too tender and break in shipment.

Conveyed to Packaging

As the baked product sheet emerges from the oven, two knives parallel to the band trim off the edges. The crumbled trim material is used in preparation of the dough-dusting flour.

Next, the trimmed biscuit sheet is transferred to a wire belt conveyor, where cooling air is blown over and under the product. The 32 in. wide sheet—16 biscuits across—is then broken into individual wafers, which are then fed into a wafer-width trough-like belt conveyor that elevates the product to the packaging room.

Biscuits are packaged in three lines. Cartons for these are made up on a company built machine designed to handle the odd-length tuck-in type container. In this machine the top and bottoms of the carton are first sealed, after which the product is inserted via the side flap.

Filled packages then travel at a 40-per-min. clip through a Pneumatic Scale bottom sealer. Next, a Johnson Overwrap unit applies the checker-design waxed wrap. Finally, 24 of the 9-oz. packages are placed into each of the shipping cartons that are closed by a standard-Knapp case sealer before loading onto skids and moving to the storage and shipping area.

An important role in the evolution of our processing into volume production has been played by the employees themselves. We have high morale and very little turnover, contributing in the achievement of maximum efficiency from the new equipment and methods.

Improved employee relations started in 1932 with an incentive system installed for paying employees extra for

and chose the

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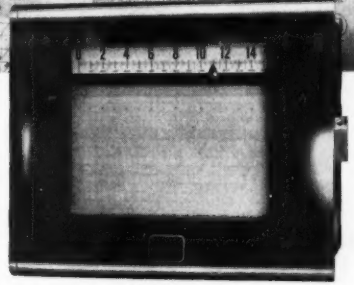

The instrument makers whose advertisements appear above know that their reputations depend upon the accuracy and reliability of their recorders. They select each component part with scrupulous care.

As the recording unit in their instruments, they all selected Bristol's Dynamaster. When you choose the Dynamaster for your own measuring needs you are assured of the same accurate, precise instrumentation demanded by these instrument makers.

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Available as a bridge or potentiometer, with strip or circular charts, Dynamasters can measure any variable that can be converted into changes in d-c voltage, d-c current, resistance, or capacitance.

Dynamasters are providing accurate, trouble-free measurement and automatic control of such quantities as temperature, pressure, pH, speed, voltage, power, current, smoke density, strain, and resistance.

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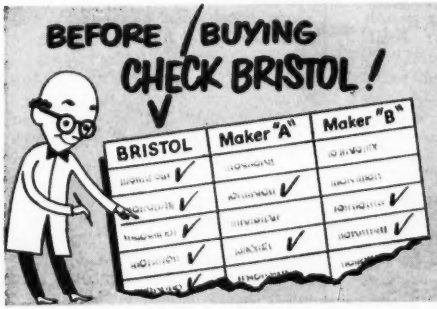

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115 Bristol Road
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Please send catalog giving details of Dynamaster performance to:

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Printweigh stops errors . . . provides *printed* weight records . . . assures you that the accurate indication of the Toledo dial will reach your accounting records without chance of human error. Prints *directly* in big, clear figures . . . on thick tickets . . . on large or small sheets . . . on strips . . . with extra copies. Saves time, stops losses, assures *accurate* weights *accurately* recorded! Send for bulletin 2021 on modern weight control. Toledo Scale Company, Toledo 1, Ohio.

On your scale MATERIAL becomes MONEY

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HEADQUARTERS FOR SCALES

work of higher quality as well as for increased production. At present, additional earnings often add up to over 15 or 20 percent of the employees' regular wages.

One of the most gratifying results of this system has been the excellent maintenance record on plant equipment. Since premiums are paid for the quality of clean-up as well as production work, mechanical equipment throughout the plant is kept spotless at all times.

Further, employees exhibit a genuine desire to keep such equipment operating at full efficiency, because of the rewards paid for the high production and quality output.

End (Resume reading on page 97)

"Mike"-Sped Maintenance

—Continued from page 73

crew. And finding a replacement necessary, these crewmen would then have had to make the round-trip to the warehouse themselves. True, the time lost by the repair crew might only be an hour or so—but the time lost on production would run to several hours, with the employees' work halted from the minute that the conveyor motor stopped.

Operating Economies

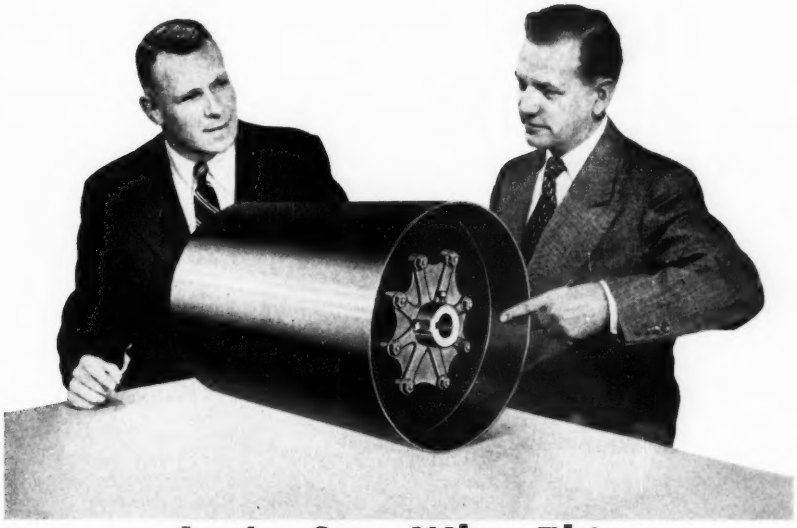
An actual check of an assignment sheet for one mobile unit illustrates how efficiently the dispatcher "keeps 'em rolling." Running a finger down the time columns, it is noted that the vehicle covered in this representative sheet was only idle 24 min. during the working day while filling a total of 30 assignments. Maximum delay from "time requested" to "on assignment" was a mere 17 min.

Since the dispatcher is in constant touch with the mobile units, unnecessary mileage is eliminated. For example, a truck enroute to one of the soybean solvent extraction plants—about a mile from the mechanical-shops center—may be contacted and asked to fill another assignment in that area before coming back.

Under the old system, an extra trip would have been necessary.

It is estimated that by putting our mobile units to maximum use through two-way radio we saved at least $18,000 during the first year—the amount that otherwise would have been required for two more trucks, and their operational expenses, to handle the same work load.

Actual savings have probably been much larger. Before our radio setup,



Let's See Why This Belt Conveyor Pulley is Best—For You

The pulley equipment on your belt conveyors or elevators has a lot to do with their performance. American steel Conveyor Pulleys, designed from research, are built by tested, controlled, precision methods, to treat belts extra well while themselves standing up indefinitely to the wear, tension and torsion imposed on them. Truly they are *Built* for the *Belt!*

Four standard constructions . . . more than 400 sizes from 6″ x 12″ to 60″ x 63″, for ½″ to 10″ shafts. Totally enclosed—dirt and splashproof—they are very light, size for size, yet unbreakable.

Rims are accurately formed of metal thickness to suit pulley size and service. Crowned or straight across entire face—whichever promotes longest belt life.

Exclusive disc and hub construction: Discs don't break, hubs don't wear nor walk on shafts, pulleys are concentric, keyways positively in line. Advanced welding techniques provide extra strength and maximum penetration at all joints.

NEW! Exclusive GRIPLEX® *Spiralagging.* Extra strong duck with top quality, extra thick rubber anchored to pulleys by special adhesive and just a few bolts—countersunk for long life and better belt protection.

NEW! "HD" *heavy-duty* pulleys with Wedg-Tite hubs have a bulldog grip on shafts

Four Types of Conveyor Pulleys by American—all Built for the Belt!

TYPE "O"—split type for mounting in tight spots like elevator casings.

TYPE "L"—for light duty—top quality at minimum cost.

TYPE "N"—for general duty—interchangeable hubs make installation or relocation easy . . . hubs tapered-fit for more efficient torque transmission—minimum bolt strain.

TYPE "HD"—for heavy duty—split tapered hubs have positive clamp grip on shaft . . . speed installation or removal.

Pulleys available almost everywhere from local distributors—backed by large factories and warehouse stocks.

Conveyor Pulleys by American—Built for the Belt!

Power Transmission by

AMERICAN

PULLEY COMPANY

The American Pulley Company
4206 Wissahickon Ave.
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Gentlemen:

Please send me your bulletin on the American all steel Conveyor Pulley line.

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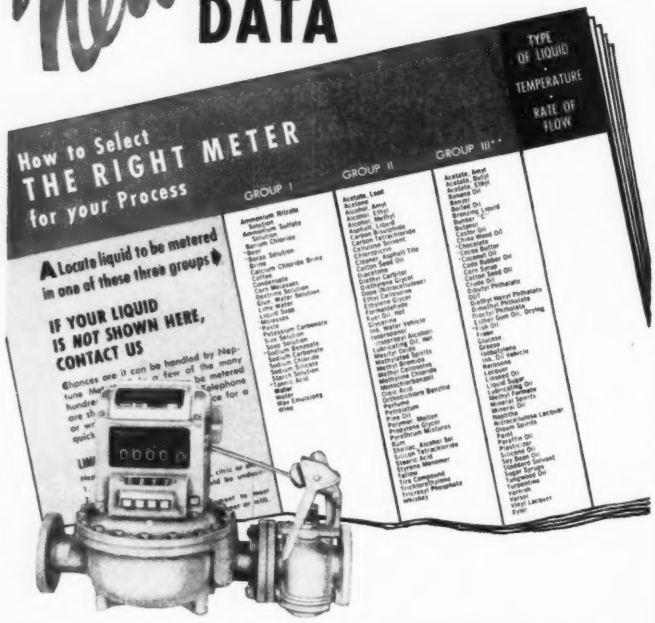
New LIQUID METERING DATA



Neptune Liquid Meters control quality and save ingredients

How to select the right liquid meters for closer formula, inventory, and cost control is the subject of this new Neptune Bulletin. It covers meters for handling more than one hundred different industrial liquids, including cold, warm and hot water, oils, syrups, brines, soap solutions and many chemical solutions that can be handled by composition bronze equipment. It shows meters from ½" to 6", with rates of flow to 1000 gpm. Registers range from simple small horizontal straight readers to the newest 432 Auto-Stop automatic batching meters. A gold mine of information for any processing engineer!

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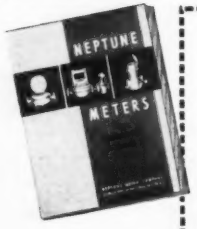

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Please rush me a copy of your new, free bulletin No. 566-KF on meters for industrial liquids.

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a crew of mechanics would often have to stand idle while waiting for the arrival of equipment. We know we have eliminated a great deal of this waste time through our speedier, more efficient radio dispatching.

Meeting Emergencies

Our maintenance records can now cite literally hundreds of emergencies where operations were benefited by the use of the radio system. Special calls are continually coming up and being acted on in a trice—where formally long hours were lost.

Just one such case was that of the sprocket from Indianapolis—related here in an accompanying box. In general routine, it is not unusual for parts to be delivered by mobile units to mechanics on the job within 15 min. after the requests are made. Sometimes the missions are multiple. For instance one fork truck is often routed by radio on several runs, ending up by hauling a "train" of equipment to various locations.

In a less dramatic, but nonetheless important, fashion, radio direction of maintenance vehicles has improved plant cleanliness and reduced clean-up costs. One of the mobile units—the Dempster Dumpster— is specially adapted for picking up and dumping the large drum-type trash containers which are located throughout each production building.

In the past, these drums were frequently filled to overflowing before a truck made the rounds to pick them up. A considerable number of hours would then have to be spent in hand shoveling "spills" to keep the plant tidy.

But such a situation is rare now that we have the radio-dispatching system in action. Today, when a building foreman has a full container, he calls the dispatcher. The clean-up truck is on the spot with an empty container in a matter of minutes, then is off with the full one to the dumping grounds.

Plant Protection

As an emergency communication system, our radio installation is ready to play a vital safety role both for us and for the nearby community. For though we use a coded whistle blast to summon fire fighters, we are also set up to employ our radio service system should the fire siren be out of operation. For this reason, all maintenance drivers are also trained members of the plant fire department.

Our system could be called upon in any major emergency. Also, though the residents of our medium-sized Midwest community are not as con-

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BAKER'S DOZEN, they used to call it, meaning something extra. We make the *something extra* in the world of steel . . . the high-alloy steels, special electrical alloys and magnetic materials that will do what ordinary metals never could do.

In equipment for peaceful uses or national defense: wherever the job needs something extra in strength, in resistance to heat, corrosion and wear, or in special electrical properties, that's where you'll find the products of the *Allegheny Ludlum Steel Corp. . . . General Offices: Oliver Bldg., Pittsburgh 22, Pa.*

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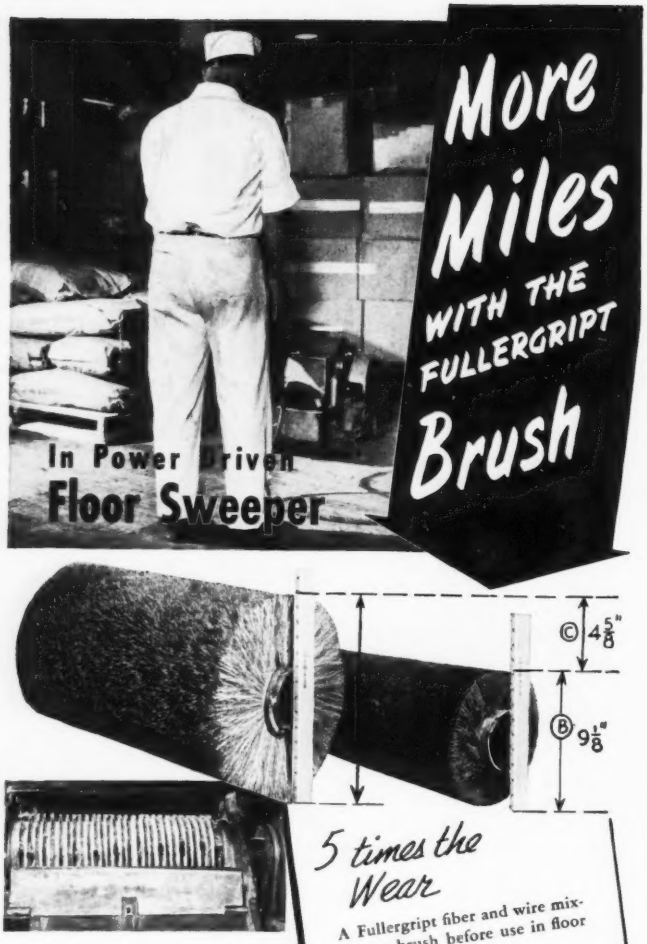
TIME-TESTED STAINLESS STEEL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WITH THE FULLERGRIPT
Brush
In Power Driven
Floor Sweeper
© 4 5/8"
Ⓑ 9 1/8"
5 times the Wear
A Fullergript fiber and wire mixture brush before use in floor sweeper.
B Same brush after 10 months service — 5 times as long as the ordinary brush lasts.
C Note that although brush has worn down 4 5/8", there is no evidence of material shedding, loose backing or warping.

Another Fullergript brush after 2 years, 9 months of service. This special, short-trimmed, crimped-wire brush was used to remove a thin layer of wood from a grease-soaked floor.

Users of power-driven floor sweepers consistently emphasize the longer brush life, the improved sweeping efficiency and the saving of man-hours with Fullergript brushes! Write us for information.

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cerned about the danger of an atom explosion as those in major industrial centers or cities, our plant radio system could, nevertheless, fill a distinct communications need if telephone service were ever destroyed in such an attack.

End (*Resume reading on page 74*)

Meter Simplifies Grading

—*Continued from page 93*

other measurements. After adjusting, the whole tomato to be measured is placed on the specimen holder.

With adjustment switch in "adjust" position, a knob is turned to set the needle at full scale (200). Then the adjustment switch is lowered to the "read" position. The yellow-to-red ratio for the sample is now indicated directly on the scale. The dial face can be designed to read directly in terms of grade for color of tomatoes.

Results of measurements by the instrument and the visual grading by two professional tomato inspectors are presented for comparison in an accompanying table. Measurements were made on separate days.

From several thousand hampers, the graders selected, on the basis of color, 25 fruits at random representing low U. S. No. 1, and 25 fruits representing high U. S. No. 2 tomatoes. In addition, tomato samples were obtained from inspector A at least twice a day during September, 1951, (when the cannery was operating) representing high and low U. S. No. 1, high and low U. S. No. 2, and cull fruits for color.

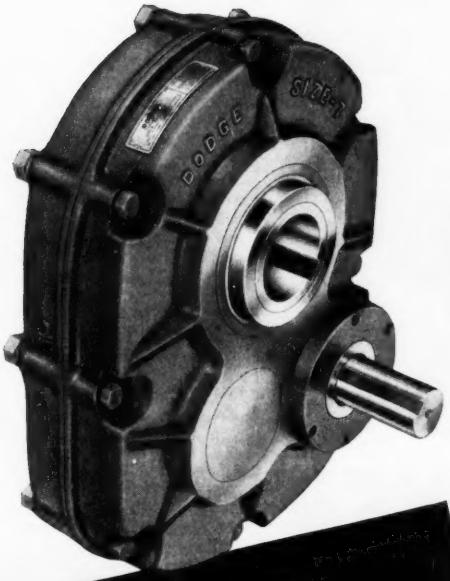
Growers pick tomatoes in the field by external color. With the introduction of new tomato varieties and hybrids, there is some question as to whether or not external color can be correlated with internal color.

Desrosier, Kellie, Stair, and Stevenson[8] studied some 30 varieties and hybrids and found that while environment and variety were important in determining tomato fruit color, external color measurements were basically reliable indicators of tomato quality.

Juice Samples Tested

In order to establish the relationship of values as obtained with the Purdue Meter and the Hunter Meter, tomato juice samples were analyzed. A 250 ml. round-bottom flask was filled with tomato juice. Readings were recorded for both instruments. The sample was then diluted with water, at the rate of 25 ml. at a time. The results of such studies are presented graphically in Fig. 2.

Tomato juice samples from many



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43 H.P.

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The Speed Reducer that saves you real money!

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- The new "big brother" of the famous Torque-Arm family. Double reduction. 43 hp capacity. Output speeds from 12 to 110 rpm.
- Rugged. Dependable. *Economical.* No special engineering required. No foundation to provide. No flexible couplings. No "lining up" difficulties. No expensive installation.
- Stock TAPER-LOCK sheaves prescribed for each job provide desired speeds. Applications to other machines is practical and easy.
- Unit is driven through any V-belt drive. A torque arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Easily installed. Sealed and lubricated inside reducer housing.
- Dodge Tri-Matic Overload Release, which provides positive protection for driven machines both mechanically and electrically, is available from stock.
- Dodge Torque-Arm Speed Reducers are built in two series—Single and Double Reduction. Eleven sizes in all, with capacities from 1 to 43 hp and output speeds from 13 to 333 rpm. All available from distributors' stocks.
- WRITE for special Torque-Arm bulletin.

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● Heavy duty electric hoist for stationary, plain, geared or motor driven trolley suspension. Single and two speed models. Capacities: ½ to 5 tons.

Here's Plant Improvement that
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LOWERS HANDLING COSTS — Picks up raw materials, or finished parts for assembly and moves them along for pennies in power and seconds in time.

ACCELERATES PRODUCTION — Takes the slowing up "lags" out of assembly line movement. One man precision "spotting". Speeds up handling in shipping.

IMPROVES PLANT MORALE — Saves the backs and muscles of men so that they may produce with "morning" efficiency in late afternoon. Aids in accident control.

Frankly, we don't know how many factories have cut costs by putting CM Electric Hoists on production jobs, but we *do know* they keep coming back for more and more Meteors and Comets. You couldn't ask for more convincing evidence of a product's usefulness to industry than a constantly growing demand.

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CM COMET High speed, sturdy, portable electric hoist. One hand control. Plug in on single or 3 phase power line. Capacities: ⅛ to 1 ton.

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U. S. production areas were measured in the round-bottom flask. Fig. 3 represents the relation between the Purdue Meter values and the score for color of the USDA Production Marketing Administration, as determined by two federal inspectors.

When measured on the Purdue Meter, tomato juice in 500 and 250 ml. flasks, and also in four different 250 ml. flasks, gave readings agreeing within one unit on the scale.

Most of the data collected with the Purdue Meter has been with intact tomato fruits. Many hundreds of fruits have been measured with the instrument, and good agreement with expert visual observations has been obtained.

Although refinements in the instrument are being made, it is anticipated that in the not too distant future supervisors in Indiana may be equipped with a meter to aid their individual inspectors in maintaining the proper color range for the various tomato grades.

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The above article is taken from "A Tomato Color Grader," Journal Paper No. 584, Purdue Agricultural Experiment Station, Lafayette, Ind. Acknowledgements are made by the authors to Prof. A. C. Todd and A. G. Gatfield, Campus Electronics Science, Purdue University, for their assistance in the development of the meter.
End (Resume reading on page 94.)

Questions & Answers

THIS MONTH'S PROBLEM

Question—As a small manufacturer of frozen citrus concentrate, we have been encountering some of the typical problems. Primary among them is product stability—preventing the concentrate from gelling in the can or separating into watery and thick juice layers. Can you advise us?

Answer to March Problem

The Question Was—As a processor of fruit preserves, we are experiencing considerable difficulty in controlling the solids content of our products. We cook in steam-jacketed kettles and closely supervise the batch-finishing point with frequently calibrated stem thermometers. Yet despite this close supervision, we sometimes get refractometer readings as much as 4 or 5 deg. Brix above a desired 65 deg. Brix. In terms of yield, this adds up to a loss of as much as 10 lb. per 250-lb. batch. What are some of the possible reasons for this deviation, and how can we control it?

Answer—The difficulty in achieving the desired finishing point may be due to several reasons. First, assuming that the thermometers are properly calibrated and accurately read, errors may be introduced due to the cooking attendant's failure to consider the barometric pressure.

Since the boiling point of a solution represents that temperature at which its vapor pressure is equivalent to atmospheric pressure, then the finishing-point temperature will be influenced by the elevation of the plant (number of feet above sea level) and prevailing weather conditions.

A product with a 65 percent soluble solids content will boil at approximately 221 deg. F. at sea level. However, with every 500 ft. increase in altitude, the boiling point will drop about 1 deg. F. This means that if the attendant is relying upon the finishing temperature alone in a low pressure area, then he will unavoidably come up with a product with a higher solids content than desired.

For instance, at 500 ft. above sea level, a 68 percent soluble solids content will be associated with a 221.4-deg. F. boiling point.

This situation can easily be remedied by determining the temperature at which pure water boils at the plant and then ascertaining if a correction factor must be employed. This factor can be obtained from data sheets, or it may be derived experimentally by determining the temperature at which a 65 percent soluble solids product (established by refractometer readings) will boil.

Second, there is a possibility that during the time elapsing between the final temperature check and the actual end of the cook, enough additional boiling occurs to increase the concentration of the preserve.

In general, use of a refractometer during the cooking process provides a more exact means of determining soluble solids content than the thermometer. And this unit may prove to be a simpler means of controlling the finishing point.—*Gideon E. Livingston, Assistant Research Professor, Dept. of Food Technology, University of Mass.*

More on Same Problem

Since you indicate frequent checks, your stem thermometer calibrations are undoubtedly accurate to a fraction of a degree. However, remember that an error in calibration as little as ½ deg. F. can result in a change in batch solids content of over 1 percent. Thus, if you boil to 220.5 deg. F., rather than the desired 220 deg. F. end-point, then the solids content will become 66 percent—a loss of almost 5 lb. in a 300-lb. batch.

While a thermometer may be accurately calibrated, it sometimes gives erroneous results in kettle boiling due to its inherent measuring lag. For example, a batch may take 3 min. to go from 217 to 220 deg. F., but the thermometer may require 4 min. to measure this temperature change. Thus, when the thermometer finally reads 220 deg. F., the true

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Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

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A delicate, smooth flavor that makes pleasurable tasting.

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ON NITROGEN IN THE FOOD INDUSTRIES

through LINDE

Day by day, more food processors and packers are turning to high-purity nitrogen to prevent deterioration of their products from oxidation. The improved storage quality of nitrogen-protected foods results in a wider margin of profit through less spoilage.

High-purity LINDE Nitrogen may help improve your product or simplify your process. Some of these LINDE reports may suggest ways to you:

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★ **"Where Trim the Oxygen Content".** *Methods for determining where and how to decrease harmful oxygen content of liquid foods.*

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★ **"Relationship of Headspace and Dissolved Oxygen in Liquid Food Containers".** *Sample calculations and nomographs for determining effective oxygen exclusion.*

★ **"Nitrogen Protection of Edible Oils".** *How to maintain peak oil quality from refinery to consumer.*

★ **"Wrapper Test Promises More Shelf Life".** *Simplifies choice of oxygen-excluding film for effective gas packing.*

★ **"How Nitrogen Protects the Quality of Foods".** *How various processors protect their products against oxidation deterioration.*

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kettle temperature may be over 221 deg. F.

It is therefore important to employ a temperature measuring device that is not only accurately calibrated but also has a minimum measuring lag. This combination will closely follow true batch temperature.

As a further suggestion in line with Professor Livingston's comment on coping with barometric changes, install an easy-to-read barometer in the process area and a chart that correlates end-point with barometric reading. Then, the operator can adjust his end-point to the prevailing atmospheric conditions.

Even more advisable would be the installation of a temperature-reading instrument or "end-point" controller with built-in feature for barometric changes. In such an instrument, changes in atmospheric pressure are automatically compensated, either in the instrument pen reading or end-point control setting.

Perhaps the ultimate solution is to employ a completely automatic kettle-temperature control system that has high-speed thermometer bulb or thermocouple measurement plus barometric compensation. Completely engineered systems are available utilizing snap-acting electric control valves and pushbutton stations. These are claimed to reproduce results from batch to batch within 0.2 deg. Brix. —*The Editors.*

Test for Enzyme Inactivation

Question—We have the problem of determining quickly if the enzyme, bromelin has been inactivated by flash-pasteurizing pineapple juice, which is concentrated under low temperature and high vacuum and then frozen. Is there a specific test? And what minimum temperature is required, under normal conditions, to inactivate this enzyme?

Answer—Presence of bromelin, in frozen concentrated pineapple juice is likely to cause irritation of mucous membranes in the mouth and throat after drinking the reconstituted juice.

However, there is a simple, yet quick, test than can be employed to learn if this enzyme is destroyed by previous heat treatment. Here's how it is carried out: To heat-treated raw pineapple juice, add an equal amount of milk. Let the mixture stand for 5 min., and if the milk curdles, then the enzyme is still active.

Depending upon the type of pineapple juice, flash-pasteurizing it for 5-10 sec. at 160 deg. F. should be sufficient to inactivate the enzyme.

Sulfuring Fruit in Bags

Question—We understand that sulfur dioxide is being used on the West Coast for sterilizing fruits that are prepackaged in plastic films. Will you please inform us on this practice?

Answer—To our knowledge, no produce packer is gassing bags of fruit with sulfur dioxide. And we question whether any responsible firm would do so. If SO_2 is used, it must be declared on the label or package.

Sulfur dioxide gas, however, is being used to prolong the shelf-life of Californian grapes — particularly the Emperor variety. But in this case the grapes are SO_2-gassed either while they are held in storage, or after they have been packed in lugs and loaded into sealed refrigerated cars. Grapes are then prepackaged.

Care must be exercised in using the proper SO_2-dosage. A little too much gas will bleach the stems and the junction between stems and berries. Excessive amounts of SO_2 will "kill" the skin — i.e., its color will be bleached and the juice will exude, causing the fruit to become sticky.

White Wines Discolored

Question—On a recent occasion, something strange happened to our white wines—the color turned yellow and the wine had a "cooked" flavor. Can you explain this condition? And how may we prevent it in the future?

Answer — It is possible that the changes in color and flavor of your wine were caused by oxidasic casse. When exposed to air, white wines turn yellow and red wines become brown. A cooked odor usually develops as well. These adverse changes are attributed to the enzyme, oxidase, which is normally present in small amounts in sound grapes and in abnormally large amounts in moldy berries. This form of casse also makes the wines cloudy due to the precipitation of tannin and coloring matter.

Depending upon the condition of the wines this troublesome enzyme can be destroyed by flash-pasteurization at 160-185 deg. F. Wines can also be protected from this action by the use of a sufficient amount of sulfur dioxide.

Wants Glaze on Roasted Nuts

Question—Our fat-fried, salted nut meats take on a dull appearance 3-4 days following processing. Can you suggest how they can be given a long-lasting glaze?

Answer—You can maintain a glossy

After 2 Years —

REGAN BROTHERS BAKERY, Minneapolis, says —— THE MULTI-CLEAN METHOD is TOPS in Floor Care

All wood floors in this high production bakery were treated with Multi-Clean Bakery Floor Preserver two years ago. Since that time, only heaviest traffic lanes have needed touching up and these not oftener than every four months. Floors subject to normal foot traffic have needed no refinishing, and floors in the sugar and flour storage rooms will last another two to three years without refinishing. This record of the wearing qualities of Multi-Clean Bakery Floor Preserver has cut its cost down to less than 1c a year per sq. ft. per coat. Other benefits have been—

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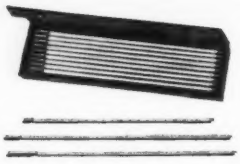

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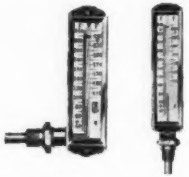

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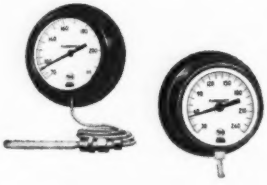

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surface on your product by frying 1 lb. of nuts in 15 lb. of high-melting-point fat or vegetable oil, such as peanut or cottonseed oils. High-melting-point fats or oils give a dryer, brighter surface finish to the nut meats.

However, it is of utmost importance to properly dry the nuts before frying, since too much moisture will result in a product with dull appearance.

The correct frying temperature must be employed for each type of nut meat. If too high, there may result premature rancidity. It is also good practice to fry the nuts as quickly as possible and then rapidly cool them. Quick cooling can be achieved by spreading the fried nuts in thin layers in appropriate pans.

As a further assurance in maintaining a glaze (and getting a uniform coating of salt), try coating the cooled nuts with a 10 percent solution of gum arabic before adding a very fine grind salt.

Be sure your product is not exposed to excessively cold temperatures that cause loss of glossy appearance.

Pie Crust Gets Soggy

Question—Our problem is to prepare a lemon pie filling that will not become watery and hence cause the crust to become soggy. Can you suggest the source of our difficulty and furnish us with a commercial formula and detailed instructions on the manufacture of a lemon meringue pie that will not have a soggy crust?

Answer—There are three possible reasons why your filling is watery and your pie crust is soggy:

First, you may be using too much citric acid, or you may be cooking the filling in the presence of this acid. This will affect the stability of the cooked lemon-starch filling. As a result, the starch will hydrolyze and become watery instead of viscous.

Second, you may not be cooling the pie-filling rapidly. Or you may not be adding the filling immediately into the baked pastry shells. After the filling is cooked, the citric acid solution must then be introduced and the pie filling should be quickly cooled and poured into the shells. If after adding the acid to the filling, you let the mixture stand in a steam-jacketed kettle for several hours, then the starch will hydrolyze and the filling will become watery.

Third, you may be storing your bulk lemon pie filling, or even your finished lemon meringue pies, in cold storage. In that case, the filling will "leak" (water separates from the filling).

Here are details on preparing a top-quality lemon filling for pie:

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"In a food plant, you can't take chances with sanitation. You have to be sure! That's why we schedule regular fumigations with Dow Methyl Bromide as an important basis for our sanitation program. We use it for treating individual shipments, too."

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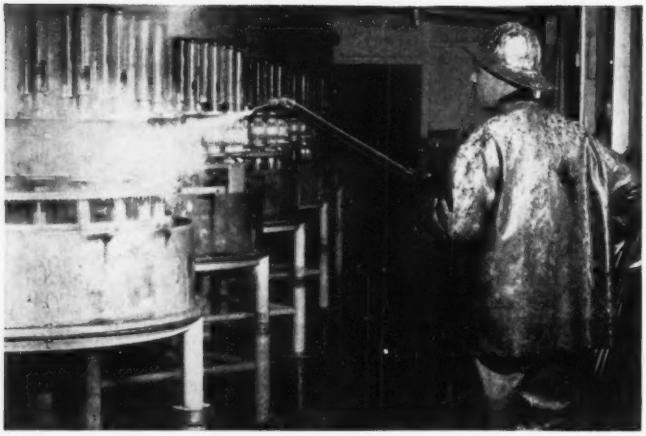

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Bring to boil: Water, 2 lb.; granulated sugar, 1¼ lb.; and salt, ½ oz. Mix, stir into the above, and cook until thick and clear: Water, 1⅛ lb.; whole eggs, 6 oz.; egg yolks, 6 oz.; and corn starch, 6 oz. Remove thickened filling from flame and stir in: Lemon juice, 8 oz.; butter, 2 oz.; and grated rind from four average size lemons.

Immediately pour the lemon filling into cooled, baked pastry shells. Cool, top with meringue, and then brown meringue in 370 deg. F. oven. Caution: Always return pie to oven on thick baking sheets.

Wants to Make Mazetta

Question—We are manufacturers of hard candies, and we propose to get into the production of chocolate-coated cream centers. Only information that we lack at the present time is a formula and method of manufacturing mazetta. Can you help us out?

Answer—You might try this formula: Corn syrup, 110 lb.; sugar, 10 lb.; water, 3 lb.; and egg albumin, 1¼ lb.

To make mazetta, proceed as follows: Soak the albumin overnight in the water. Add half the corn syrup into a Savage beater. Cook the sugar and the remaining corn syrup to 248 deg. F. and add it to the syrup in the beater. Beat for 4 min., add the egg albumin solution and then continue beating for about 8 min. Fill into suitable sterilized containers.

Caution: Mazetta should be prepared not more than 24 hr. before using in your products.

More on Peanut Butter

The answer to the March Q&A's question, "Stabilizing Peanut Butter," neglected to mention another suitable peanut-butter stabilizer—highly refined glyceryl monostearate. This product has a melting point of about 140 deg. F., and it is being successfully used as a stabilizer of peanut butter to prevent sweating of the oil during storage. To prevent oil separation, add ¼-½ percent by weight of the glyceryl monostearate to the peanut butter.—*The Editors.*

Correction

In the answer to April Q&A, "Shelf-Life of French Dressing," the second paragraph reference to a specific oil dressing should have read "5 to 6-months' shelf-life." The period was incorrectly printed as weeks.

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Useful New Books & Government Publications

Making Potato Chips

POTATO CRISPS. *By A. E. Williams. Published by Food Trade Press Ltd., 7 Garrick Street, London, W. C. 2. 1951. 106 pages; 5¼x8½ in.; cloth. Price $3.*

All the factors to be considered in making potato chips (called "crisps" in England) are thoroughly evaluated in this short, but complete, review.

Divided into four sections, it initially guides the reader through the science of potato agronomy and carries on through to a consideration of equipment used today in processing chips, the latter being presented in the well-illustrated final section.

The second section, following the first on cultivation practices, covers oils and fats that may be encountered while making chips. Procedures for testing these oils are outlined. And the third section is concerned with processing technics, with special emphasis on how to handle varying starch and water contents in the raw material.

On Supervisory Technics

PROCEEDINGS, 15TH ANNUAL TIME AND MOTION STUDY AND MANAGEMENT CLINIC. *Sponsored by The Industrial Management Society, 35 East Wacker Drive, Chicago 1, 1951. 128 pages; 8½ x 11 in.; paper. Price $4.*

This booklet represents a verbatim record of the Society's Clinic held in Chicago last fall. It will be of value to those interested in organizing systems dealing with methods and personnel procedures.

More than 25 meaty papers cover such topics as developing plant functions using pre-determined time values, graphic methods, job evaluation procedures, and statistical quality control.

Graphs, curves, and forms are reproduced with many of the papers to provide pictorial documentation.

Flavors Cataloged

THE ESSENTIAL OILS, VOL. V. *By Ernest Guenther. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, 1952. 507 pages, 6¼ x 9¼ in.; cloth. Price $9.75.*

This work, like the two previous volumes in the series, describes the production, physic-chemical properties, chemical composition, and uses of individual essential oils. (The author expects to complete this phase of his series in a sixth volume—to be published shortly.)

Many oils of importance to the flavor chemist are discussed in detail. Among them are nutmeg, cardamom, pepper, cubet, star anise, and ginger. Groupings are within the botanical families to which the corresponding plants belong, thus making for ready reference.

Of particular interest are the many illustrated and detailed descriptions of the processing of the essential oils. Offering a better understanding of the "background" of these ingredients, they should prove of value to users in drafting up-to-date specifications.

World productivity conditions are also carefully analyzed by the author. This information will be helpful to processors interested in long-range availability of the oils.

Legal Can-Labeling

MODERN LABELS FOR CANNED FOODS. *Edited by the Labeling Committee of the National Canners Assn. Published by the National Canners Assn., Washington, D. C., 1951. 315 pages; 6x9 in.; paper covered, looseleaf. Price $1.25.*

Prepared as an up-to-the-minute service manual for those actively engaged in the canning field, this looseleaf volume covers in clear, easy-to-read form the F&DA requirements for legal labeling.

Major part of the book deals with a summary table of terms to be used with all canned foods—each product listed separately. Other sections clarify the legal phraseology of the FD&C Act in explaining voluntary labeling practices, points on sample labels; and net-contents statements for foods.

On Keeping Plants Clean

SANITATION FOR THE FOOD-PRESERVATION INDUSTRIES. *Prepared by the Assn. of Food Industry Sanitarians, Inc. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, 1952. 284 pages; 6¼ x 9¼ in., cloth. Price, $5.*

"Prevention of trouble before it occurs" may be called the theme of this sanitation manual. In it, the editors (with the cooperation of the National Canners Assn.) define the scope of food plant sanitation and present a "how-to-do-it" approach. Also, more than 40 correspondents present expert.

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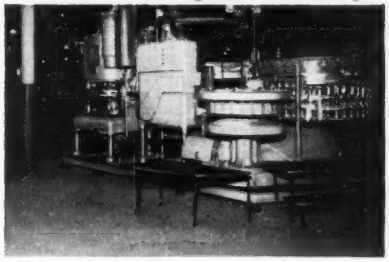

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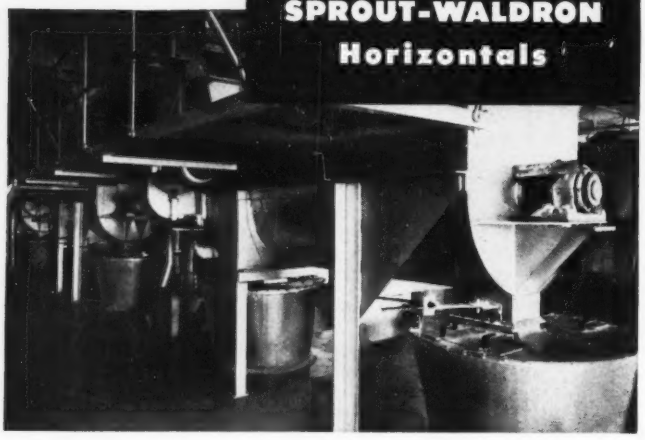

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Chapter titles are: Organization of a Sanitation Program; Inspection Technics; Housekeeping; Animal, Bird, and Insect Pests; Significance of Microorganisms; Water Supply; Construction and Maintenance of Building and Equipment; Cleaning; Chlorination; Employee Facilities and Industrial Hygiene; Feeding and Housing; Waste Treatment and Disposal; and Laboratory Aids to the Sanitation Program.

Government Publications

METHODS OF MEASURING HUMIDITY AND TESTING HYGROMETERS. *By Arnold Wexler and W. G. Brombacher. National Bureau of Standards, Circular 512. Price 15¢* Reviews methods for measuring water-vapor content of gases, describes equipment, and lists references.

HANDLING APPLES FROM TREE TO TABLE. *By D. F. Fisher and Edwin Smith. U. S. Department of Agriculture, Circular No. 659. Price 20¢.* Discusses factors of mechanical handling, storage atmospheres, and biologic factors. Information is pertinent to other commodities.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

DAIRY AND POULTRY MARKET STATISTICS, 1950. *Production & Marketing Administration, U. S. Department of Agriculture, Statistical Bulletin No. 102. Price 50¢.* Annual summary of market statistics.

FOOD GUIDE FOR OLDER FOLKS. *U. S. Department of Agriculture, Home and Garden Bulletin No. 17. Price 5¢.* Tells about older people's food needs and how to meet their special problems.

SOYBEANS FOR FEED, FOOD, AND INDUSTRIAL PRODUCTS. *U. S. Department of Agriculture, Farmers' Bulletin No. 2038. Price 15¢.* Discusses comprehensively uses of soybean meal and oil and considers about a dozen different soybean products for human consumption.

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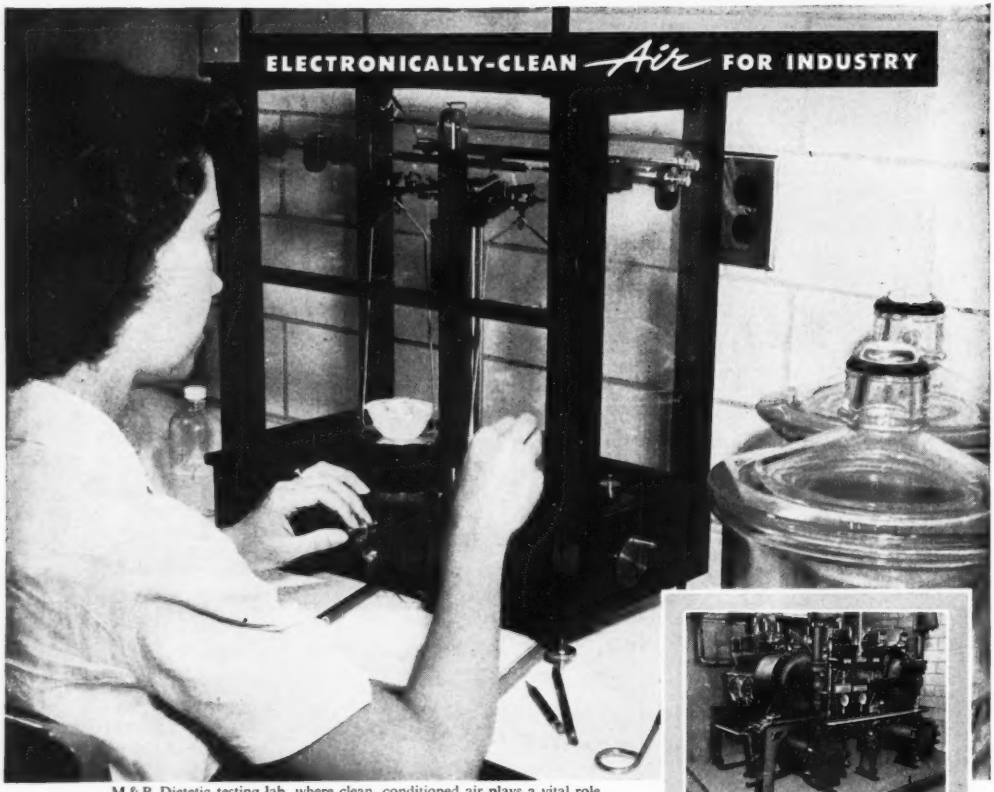

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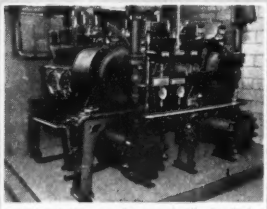
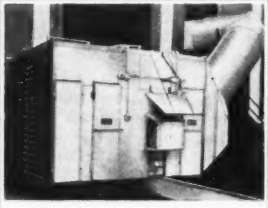
PRECIPITRON also increases production. In one separating process, 20% of the dried milk was once discarded because air-borne contaminants passed through mechanical air filters. Now 100% is useable, and is better graded too. In the testing lab, precisely-controlled humidity and temperature help improve product uniformity and increase the efficiency of the technical staff.

There's a complete line of Westinghouse equipment to help you *put air to work*—with electronic air cleaning, air handling, or air conditioning. Contact your local Westinghouse-Sturtevant office, or write Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.



Westinghouse Hermetically-Sealed air conditioning compressors can be installed in an unventilated space.



PRECIPITRON stops dirt *before* it enters the building. Its efficiency is triple the best mechanical cleaner.

There's nothing to remove from PRECIPITRON but dirt. It's periodically washed down drain with a water hose.

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

Brighter Materials Picture

Increase in production facilities and new imports are going a long way toward solving the materials shortage problem.

This was pointed out by Manly Fleischmann, Defense Production Administrator, in his review of the situation presented at the recent Packaging Conference in Atlantic City.

Here, in brief, is the outlook for the various materials:

Carbon Steel—Supply situation improving daily, and barring a major strike or all-out war, there will be no shortage by end of this year. Carbon steel now in good supply, except for certain forms such as heavy plate, seamless tubing, and bars.

Aluminum—Production due to hit new peak by first quarter of '53. Rapid expansion of output seen easing aluminum by then. Relaxing of controls to be considered.

Aluminum Foil—It has been in tight supply because of high-grade metal used. However, situation has eased, hence should improve during coming months.

Copper—Production increase slow. No betterment of situation seen before 1954 or 1955.

Nickel—This stainless steel ingredient is tightest of all, and will continue tight as long as jet-engine program is in effect. Commercial users will have rough going for years.

Tin—Because of deals to increase imports, problem in respect to this metal is considered well on way to a solution.

Black Plate—Steps toward decontrol of this metal will be taken in near future.

Polyethylene—Supply of this packaging material increasing rapidly.

Phosphated Meat Pickle

Di-sodium phosphate may now be added to the pumping pickle for cooking and canning hams, pork shoulders, and the like, according to the Meat Inspection Div. of the USDA.

This additive is said to increase yields and aid in retaining natural moistures and juices in the meat by raising the pH of the pickle.

A 5 percent upper limit has been put on the amount of phosphate in the pickle, with the finished product not to contain more than ½ percent.

When di-sodium phosphate is used, a statement such as "di-sodium phosphate added" or "with added di-sodium phosphate" is to be prominently displayed on the label in direct connection with the name of the product.

Ice Cream for Diabetics

Acceptable, sugarless ice cream may soon be available to diabetics—sorbitol taking up the slack.

The problem in making ice cream suitable for diabetics is to remove the sugar solids without changing the freezing point of the ice cream. Early diabetic ice cream was no substitute for the regular product, since it had few characteristics of ice cream other than being cold.

Recently, interest has developed in sorbitol, a sweet tasting food alcohol that has been used for some time in foods as a means of retaining moisture.

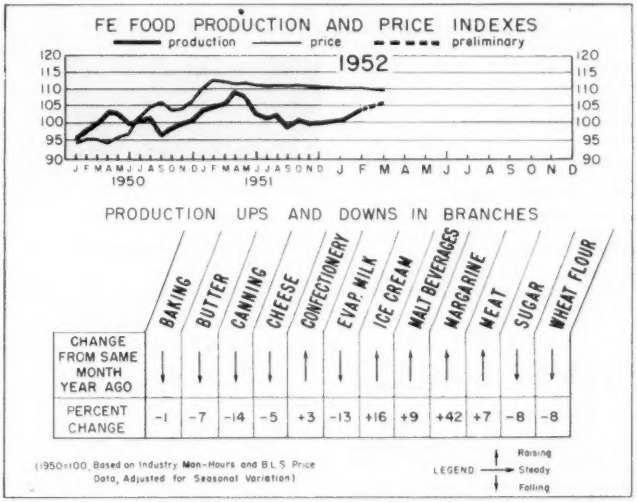
In addition to lending sweetness, sorbitol is capable of lowering the freezing point to give normal body and texture to ice cream. The food alcohol is not readily used by the body, hence there is a delay in its entrance as a sugar into the human system.

Research on the project has been conducted at The University of California College of Agriculture, Davis, Calif., under B. E. Hubbell, Jr., dairy industry specialist.

Richer-Hued Jams

Accenting the red color of fruit jams has long been the aim of many preservers. Now the addition of a comminuted whole cranberry concentrate (in about a 1 to 3 ratio) may prove to be a good answer to the problem.

W. F. Filz, of the Guy C. Myers Cranberry Co., speaking before the



HERE IS FOOD ENGINEERING'S expanded index service—revised food production index plus the new processed-foods wholesale price index.

The revised production index takes account of two factors: (1) A more up-to-date base period, 1950, has been selected. This represents a more "normal" year in the food industry than any other postwar year (old base was 1939 equals 100). (2) Unit productivity in the food industry, on the average, has been making gains in the last two years. Some food branches—for example, canning and freezing—have recorded bigger increases in productivity than many other manufacturing fields.

The new price index covers processed foods, non-alcoholic beverages, and malt liquors. This index combines Bureau of Labor Statistics price data for the above groups. In order to compare month to month price movements with production trends, the price index is also placed on the 1950-equals-100 base.

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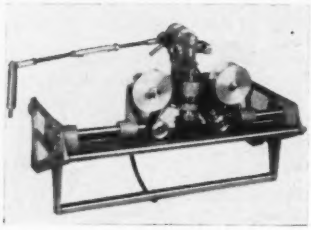

FEATURES

For leaf printing with continuous and intermittent packaging machines that do overwrapping.

- **The "Rainbow" imprints code, price, etc., in all colors.**
- **Attached to and takes motion from machine itself.**
- **Makes permanent imprint thru roll leaf with heated metal type.**
- **Adjustable to feed minimum requirements of roll leaf (no waste).**
- **Spot prints accurately directly on cellophane, glassine, wax paper, pliofilm, foil, etc.**
- **No ink. No make-ready. Minimum maintenance.**
- **Attachments built for Hayssen, Battle Creek, Stokes Wrap, Trans Wrap, Hudson Sharpe and similar machines.**
- **Especially suitable to and gives wonderful results on wrapped Bacon, Bakery Products, Fish, Frozen Food, etc.**
- **Send us your Code Dating or Marking problems and we will furnish recommendations.**

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Automatically dates, codes, or marks production runs of cartons, packages . . . readily adapted to present conveyor lines.

Friction between Marker and moving package or carton will imprint date, code or any other information. Will automatically spot-print legend. No oscillation of printing drum.

Inking through felt roller with self-contained reservoir. Interchangeable rubber type.

Used by candy manufacturers, distillers, oil companies, food packers, etc., to mark filled bags, cartons, boxes, rolls, cans, etc.

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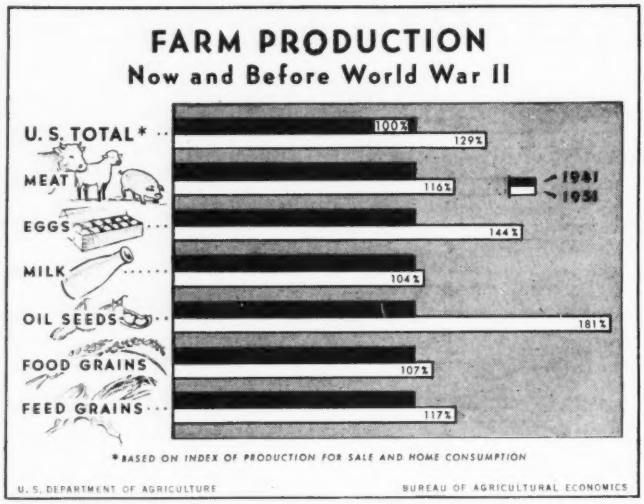

recent convention of the National Preservers Assn. in Chicago, described how the addition of cranberries to strawberry and other red jams almost doubled their characteristic red color. Also, color retention in the resultant product stored at 70 deg. F. was found to be better.

The McFarlin variety of cranberry was used for the development work.

Another advantage is that cranberries—being naturally high in pectin—contribute most, if not all, of the required gelling agent when used as a supplement. Jellies, however, cannot be satisfactorily "set" with this material.

IFT Program Subjects

Plans are now set for the twelfth annual meeting of the Institute of Food Technologists at the civic auditorium, Grand Rapids, Mich., June 8-11.

The program lists a diversified slate of subjects, speakers, and field trips among the 5 section meetings, 14 technical symposia, and 2 general sessions.

After the general opening gathering Monday morning, there will be a timely session on chemicals and additives in foods. Such subjects as the activities of the Food Protection Committee, toxicity testing, and the legal framework of the problem will be discussed.

Also on Monday there will be a symposium on the use of flexible materials in food packaging, as well as two sections for presentation of research papers on fruit and meat products.

Tuesday's sessions are to include talks on food research planning and new food products. Displayed in the meeting room will be many of these products that have been made available during the past 18 months. Other Tuesday section meetings will concern control of enzymatic reactions, food engineering, frozen foods, fermented food products, food plant sanitation, and a discussion meeting for those interested in citrus technology.

The technical program for Wednesday is to include symposia on flavor analysis and food acceptance, control of microorganisms in foods, education and curricula, cereal technology, and deterioration of foods.

There will also be four sections for the presentation of research papers on milk and eggs, vegetable products, fruit products, and microbiology.

Packaging Speeds Selling

Today packaging is mushrooming into one of the foremost U. S. industries. In the food field alone, the average housewife opens 575 cans a year and an annual total of some 1,700 packages of all kinds.

These facts were brought out by H. F. Lochrie, of Birds Eye-Snider, in an address before the Packaging Conference in Atlantic City last month. Given stress was the increasing importance of packaging for the self-service market.

Further implementing his paper with several statistical studies, Mr. Lochrie cited these findings from recent du Pont surveys:

The average shopper passes through a self-service, pre-packaged produce

department in 24 percent less time than she takes for a regular service department. Yet she buys 16 percent more produce. And she passed through a pre-packaged meat department in 41 percent less time. Yet she buys 9 percent more meat.

"Eye-Catching" Items

How impulse buying plays an important role in the modern housewife's shopping routine was emphasized by Norman S. Rabb, vice-president of sales, Stop & Shop, Inc., Boston, in a talk at the recent Packaging Conference in Atlantic City.

To take advantage of this profitable spur-of-the-moment factor, food packers should pay more attention to attractive package design, pointed out Rabb, who then made nine pertinent suggestions on improving containers.

1. The package should look like what the customer expects. 2. It should be designed to appear as large as possible. 3. Transparent containers should not be printed over such a large area that a clear view of the contents is obstructed. 4. The package printing should be easy to read. 5. The package should have an up-to-date look. 6. It should be easy to open and close. 7. Good pictures ought to be used or none at all. 8. Package size should be aimed at a popular price range. 9. There should be protection against soiling, contents loss, flavor and aroma deterioration, moisture loss and absorption, and spoilage.

Packagers Set Record

An all-time attendance record of over 21,500 representatives was registered at the National Packaging Convention held in Atlantic City last month.

Sponsored by the American Management Assn., the show spotlighted packaging for self-service outlets. Sales of packaging machinery were reported brisk due to the general brightening of the materials picture.

Ozoning Nuts and Grains

Special ozone generators may soon be used in Brazil to minimize rotting and mold formation in nuts and grains during storage. Preliminary investigations indicate that a small amount of ozone, if present in the ventilating air stream, will counteract the prevalent dampness found in tropic areas.

A new company to be known as Industrias Electroaire do Brasil, S.A., will soon begin commercial operations of this type. Headquarters for the company will be Manaus, capital of Amazonas and main Brazil-nut center.

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can no more afford to skimp
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than can the makers of
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for candy — regardless of type —
derives its principal appeal
from FLAVOR . . . .
from such extra good flavors
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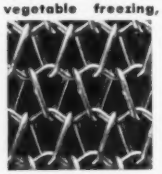
Your Cambridge Field Engineer can show you how woven wire conveyor belts combine movement with processing to reduce handling costs, boost output.

Whatever type of food you are processing . . . regardless of whether it is cooked, frozen or fresh . . . there's a Cambridge Woven Wire Conveyor Belt to combine movement with processing, thus reducing manual handling and increasing production.

Cambridge belts can be woven from any metal or alloy . . . including stainless steel to meet sanitary requirements . . . to any mesh or weave. Where needed we can provide special side or surface attachments to hold the product during movement up or down. In processing through liquids . . . washing, blanching or cooking . . . open mesh of the belt permits uniform processing and free drainage of the liquid. For baking or freezing, open mesh of the belt permits free circulation of air within the process chamber.

Your Cambridge representative has available a specially prepared set of flow sheets describing in detail how wire belts are used in meat packing, vegetable freezing, fruit canning, sugar refining, candy manufacturing, brewing, cracker baking, ice cream and other food plants. Call your Cambridge man in soon; it costs you nothing to get his experienced advice. See "Belting-Mechanical" in your classified telephone book or write direct for the name of our man in your territory.



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Status of Plant Expansion

The food industry is still getting only a miserly share of the Defense Production Administration's certificates of necessity. And of the total, processed fruit and vegetable people appear to have the highest priority for any future expansion.

Through Feb. 25, 1952, there were 43 plants altogether which had received approval, with 31 others still awaiting word on their applications.

The table below presents the latest available breakdown covering both winning certificates and those still pending. Also included are average figures for each industry branch, indicating the rate of tax writeoff allowed.

Branch	Number Approved	Proposed Investment (Thousands of Dollars)	Tax Amortization Allowed (as % of Investment)	Number Pending	Proposed Investment (Thousands of Dollars)
Meat packing	...	.....	....	6	1,145
Poultry and small game dressing	3	85	24.7	1	226
Condensed and evaporated milk	1	288	50.0	...	.....
Special dairy products	1	356	50.0	...	.....
Canned sea foods	...	.....	.....	4	2,506
Canned fruits, vegetables, soups, preserves	31	6,355	34.6	12	2,005
Dehydrated fruits, vegetables	2	491	70.7	1	530
Frozen foods	1	222	25.2	1	262
Flour, other grains	1	305	50.2	1	108
Cane sugar refining	1	2,146	25.0	...	...
Shortening, fats, oils	1	310	9.0	...	...
Corn products	...	.....	.....	1	203
Miscellaneous	1	200	65.0	4	150
Totals	43	10,758	34.9	31	7,135

Syrup Flavor Accented

The natural flavor in maple syrup can be intensified four to six times by using an inexpensive heating process developed at the USDA's Eastern Regional Research Laboratory in Philadelphia.

In this method, the syrup is heated for 2 hr. at atmospheric pressure and a temperature of 250 deg. F. Equipment used for this heating is designed to keep moisture losses at a minimum—any water lost by evaporation is restored afterward. Little or no non-maple flavor is developed, according to the researchers.

Cost for this extra treatment step is estimated at about 10c. a gallon. The product may be blended with cane-sugar syrup, made into maple syrup concentrates (in both liquid and solid forms), or used as a flavoring agent.

Candy Pioneer Honored

James P. Booker of Ross & Rowe, Inc., New York City, has been selected to receive the second annual Stroud Jordan Award given by The American Assn. of Candy Technologists.

Mr. Booker was cited for his work

on the use of yeast in fondants and the identification of invertase as the beneficial substance in yeast.

Presentation will be made during the fourth annual meeting of the group on June 3 at the Conrad Hilton Hotel, Chicago.

Mr. Booker was one of the authors of the Matthew Berman Book, *The How and Why of Candy Making.*

On Sub-Scalding Poultry

What are the relative advantages of sub-scalding vs. semi-scalding of poultry? M. I. Darrow of Swift & Co. provided a few of the answers at the recent Institute of American Poultry Industries Fact Finding Conference held in Kansas City.

Sub-scalding (134-142 deg. F.) shows promise of cutting processing costs and reducing pinfeathers, as compared with the performance of semi-scalding (126-129 deg. F.). Mr. Darrow added that for broilers, 138 to 140 deg. F. for 25 to 30 sec. seemed to be the desirable scalding temperature and time for the most efficient dressing results.

Sub-scald poultry can probably be successfully merchandised in frozen cut-up packages and in unfrozen, moisture-proof film wrapped packages, said Darrow, because in both cases a protective covering is present and the appearance of the lighter colored poultry isn't objectionable.

It is noted, however, that some sub-scald poultry will show a lack of tenderness when compared directly to semi-scald birds. Tenderness is, therefore, a problem that needs considerable investigation before the industry adopts sub-scalding on a large scale.

Review Meat Research

Biological aspects were stressed in the recent Chicago research conference sponsored by the American Meat Institute.

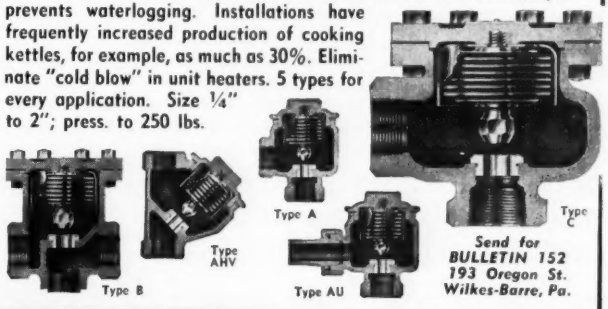
Of particular interest was a paper by C. F. Niven, Jr., of the AMI Foundation on *Significance of the Lactic Acid Bacteria in the Meat Industry.* These bacteria are known as a nuisance factor, but according to the author they may now prove to be an aid in processing.

Lactic bacteria are seen by him as valuable in the production of certain cured and fermented sausages. If a straight nitrate cure is used on the product it should be sufficiently reduced for the lactic acid bacteria to work, since insufficient reduction will result in poor color and failure of the product. An interesting conjecture is that "starters" with nitrate-reducing

Nicholson Steam Traps Require

NO CHANGE of VALVE or SEAT, 0 to 250 Lbs.

Nicholson steam traps save the time and trouble of adjusting valves for varying pressures. This feature substantially speeds production and maintenance. Made of hardened stainless steel, the valve is extra large, resulting in from 2 to 6 times average drainage capacity. Both valve and seat are renewable. The fast action of Nicholson traps prevents waterlogging. Installations have frequently increased production of cooking kettles, for example, as much as 30%. Eliminate "cold blow" in unit heaters. 5 types for every application. Size ¼" to 2"; press. to 250 lbs.



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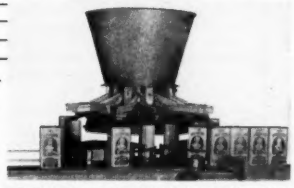

Six of Model F-O's used to make up a rapid package filling machine.

Model F-O with Flat Pan Trough

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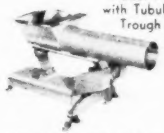
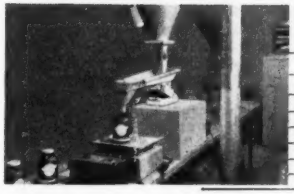
Model F-I with Tubular Trough



Model F-O fitted with special boot, filling jars.



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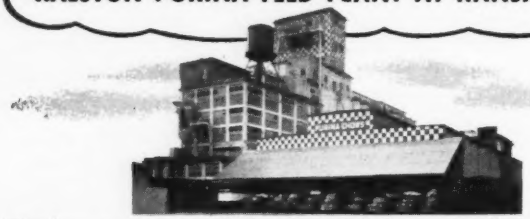


"Doing a very satisfactory job" *. . . says Ralston Purina*

With reference to the DAY Dust Control equipment installed in various of its properties, the Ralston Purina Company is well satisfied. Shown here is the Purina Chows plant at Kansas City, Missouri, where a DAY Dust Control System was installed in 1951. High feed production with efficient dust control is the report from this plant where a complete line of more than 50 poultry and animal Purina Chows are processed at the rate of 1,000 tons daily.

DAY ENGINEERS DUST CONTROL FOR ALL SIZED PLANTS IN THE FEED AND FOOD PROCESSING INDUSTRIES . . .

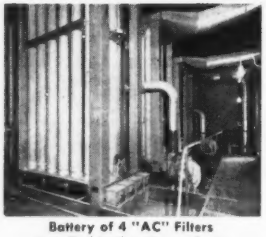
Whether your operation is large or small, whether it is a feed or cereal plant, food processing plant, candy factory, mill or elevator, DAY engineers will advise you and help you solve your dust problem. You will benefit from The DAY Company's 71 years' experience in engineering, manufacturing and installing dust control systems, and its unceasing efforts to develop equipment for the most efficient and economical dust recovery.

WHAT DAY DUST CONTROL WILL DO FOR YOUR PLANT

DAY Dust Control effectively: (1) recovers valuable product, handling several different product streams simultaneously without mixing; (2) removes obnoxious dust; (3) minimizes plant hazards; (4) improves working conditions and labor relations; (5) cuts maintenance and housekeeping costs; (6) eliminates neighborhood dust nuisances; (7) reduces pest infestation and product contamination.

The DAY Company
ENGINEERS, MANUFACTURES, INSTALLS:

- Dust Control Systems
- Dual-Clone Dust Separators
- Spouting and Leg Casings
- Pneumatic Conveying Systems
- "AC" Dust Filters
- Exhaust Fans
- Bulk Storage Bins
- Vacuum Type Bag Cleaners



Battery of 4 "AC" Filters installed in the above plant.

WHY DAY "AC" DUST FILTERS MEET THE NEEDS OF FEED AND FOOD PLANT OPERATORS

Continuous-Automatic Operation: no filter shutdowns for cleaning or rapping . . . reverse air jet rings move slowly up and down the tubes, cleaning them continuously . . . with a maximum cloth area loss of only 1¾% at any time.

High Filtering Efficiency: with gentle, yet positive reverse air jet cleaning, high grade filtering felt is used resulting in higher filtering efficiencies. Also, the use of high grade felt allows higher air-to-cloth ratios of 10, 15 or even 20 to 1 with uniform back pressures.

Constant Air Volume: with shutdowns for cleaning eliminated because of the continuous, automatic cleaning action of the filter, constant air volume is assured. Back pressures level off after starting and remain uniform.

For engineering assistance and cost estimates
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organisms might actually be a good addition to a curing solution.

"Cloudy" pickle solutions are due to presence of lactic bacteria, which are tolerant of acetic acid. A minimum of 3.6 percent acetic acid must be used to inhibit this effect—but then palatability is lowered.

Also these bacteria are known to form a ropy slime on meat in curing cellars. One way of combating this phenomenon employs a sucrose polysacharride to simply replace sucrose with dextrose in the curing formula.

In another paper, on bacteriological problems in thermal processing of meats, C. E. Gross of the Morrell research laboratories discussed the necessity of complete destruction of microbiological life in many canned meat products.

Gist of this report was that plant aerobic spore loading is probably the limiting factor in reducing meat product processing time. And there was re-emphasis on the necessity for using the shortest periods of heat treatment possible to maintain the best flavor during storage.

Future Meat Investigations

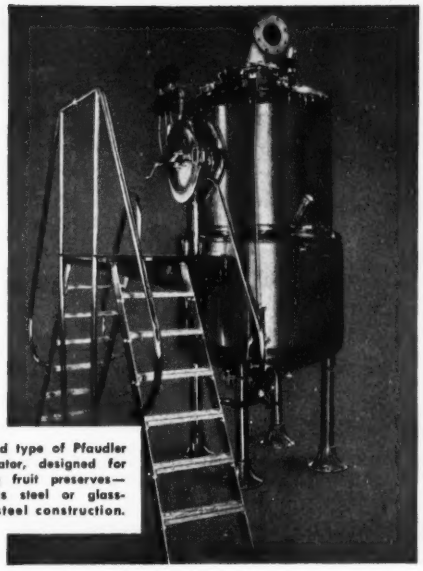
A number of new projects will be started this year by The Council on Research of the American Meat Institute. Prominent among them are:

Looking into cause of greenish discoloration in sausage and cooked meats. Isolating responsible bacteria and finding practical methods of prevention.

New Food Tech Head

Bernard E. Proctor has been appointed head of the Department of Food Technology at M.I.T. Long active in the food field, he is president-elect of the Institute of Food Technologists and active as an advisor to many governmental agencies. He has been on the M.I.T. faculty since 1926.

Are you boiling away the SALES APPEAL of YOUR PRODUCT?



Jacketed type of Pfaudler Evaporator, designed for making fruit preserves—stainless steel or glass-lined steel construction.

Vertical tube type Pfaudler Evaporator for concentrating large volumes of juices, syrups, milk, etc.

Open kettle boiling of fruits and juices sure can wreck their sales appeal in a hurry. It ruins all natural characteristics. It may even cost you more to process. Most important, it makes it tough to sell the final product. So why do it the hard way?

Besides processing at a lower boiling point, Pfaudler Vacuum Process Equipment enables you to accurately control the operation from start to finish. This uniform control helps you to stabilize natural flavor, color and bulk of fruit products; it helps you maintain the natural color and taste of juices, jellies, jams, syrups and flavorings. You eliminate carmelization. Most important, you enhance sales appeal by controlling all aspects of the processing cycle.

In many cases, you can reduce the cost of operation—since less labor is required. In one instance a preserver reduced manpower 50% while producing 80% more volume. This is important for two reasons—you reduce manpower requirements and overall processing cost.

Whether your process requires a jacketed vacuum cooker or large vertical tube heat exchanger evaporators, Pfaudler has the know-how to completely engineer your plant. It assumes the responsibility for achieving desired results. Let us help you with your problems. Use coupon below.

Pfaudler Vacuum Process Equipment Preserves the Sales Appeal of Your Product

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK
Engineers and Fabricators of Food Processing Equipment

Gravity Fillers · Deaerators
Piston Fillers · Vacuum Pans
Steam Peelers · Evaporators

THE PFAUDLER CO.
Dept. FE-5 Rochester 3, N. Y.

We are interested in Pfaudler Vacuum Evaporators for processing .....

Name .....

Address .....

Company .....

City ..... State .....

For more information, use post card on last page.

Stop INSECT SPOILAGE

...with "ENTOLETER" Continuous Insect Control

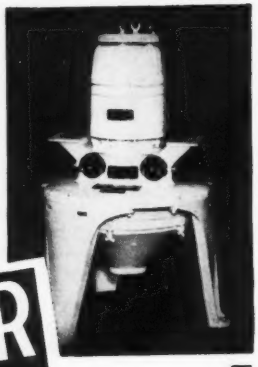
This low-cost Continuous Insect Control is paying off in hundreds of processing plants, by permitting the manufacture of food products free of insect-life.

"ENTOLETER" Infestation Control destroys all stages of insect-life... eggs, larvae, pupae and adults... in flour, meal, mixes, cereals, powdered soups and similar free-flowing dry materials.

It protects incoming raw materials, materials before and after storage, and your finished products before packaging. By destroying all insect-life, the threat of insect multiplication is eliminated, and food materials are protected from adulteration by insect excreta.

In addition to its primary function of insect control, the "ENTOLETER" system is an excellent means of blending flours, mixing compounds, and improving vitamin distribution. It is entirely mechanical; uses no heat, gas or chemicals; and does not change the moisture content of food ingredients or products. The "ENTOLETER" Centrifugal Machine is easy to install; simple to operate and maintain.

Send coupon today for Bulletin describing important "ENTOLETER" applications for food processors.



ENTOLETER CENTRIFUGAL MACHINES

CONTINUOUS INSECT CONTROL SYSTEM

ENTOLETER DIVISION

The Safety Car Heating and Lighting Co., Inc.

P.O. Box 904, New Haven 4, Conn.

Send full information on "ENTOLETER" Continuous Insect Control system.

Name .....

Company .....

Address .....

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Foreign Distributors Henry Simon, Ltd., Stockport, England

(Studies of staphylococcus in food poisoning.

(Affects of processing on the nutritive value of meats, with consideration of amino acid and protein deterioration.

(Changes occurring in bacon protein during frying.

(Basic factors in beef quality, including effect on tenderness of amount and dispersion of fat in rib eye and round cuts. Findings ultimately to be used to "build" optimum physical makeup in cattle.

(Search for better lard antioxidants.

(Changes in beef due to dehydration and rehydration.

(Processing of meats with high-frequency dielectric heating rather than regular thermal means.

Citrus Gleanings

Florida citrus processors are in the midst of a hectic season—what with a bumper crop of oranges, increasing competition in the concentrate field, and rapid strides in research and development.

Refrigerated freshly-squeezed juice is currently being transported in insulated tank trucks at 32 deg. F. from

(*Turn page*)

Hors d'Oeuvres

• The average candy maker in France faces an almost insurmountable task in streamlining his production—the consumer insisting on a continuous change in package design and color. Just what was that, again, about 50 million Frenchmen being wrong?

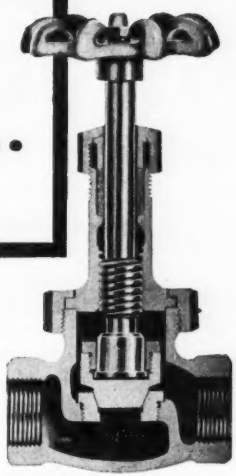
• *Cafeteria in a Brooklyn factory is trying a new employee-relations gimmick with the posting of calories as well as prices for all foods served. Sorry, just won't eat a thing until a vitamin list is displayed alongside.*

• A recent survey has shown that the average New York family pays more in federal taxes every year than it does in the city's retail food stores. With the government taking it "high off the hog" there won't be much left but pigs feet for the taxpayers.

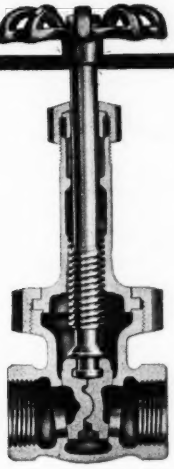
• *Latest hiccup cure (devised by Texas women): Sipping a brew made by boiling garlic in water and keeping a hot water bag on the abdomen night and day. Faced with this prospect, the victim probably stops hiccuping in self-defense.*

• One of our leading macaroni companies has signed up Joe DiMaggio for the season —to plug its products on a weekly television show. The Yankee Clipper may not hit any homeruns with meatballs, but he'll still be paid by batting in cleanup position at homeplate.

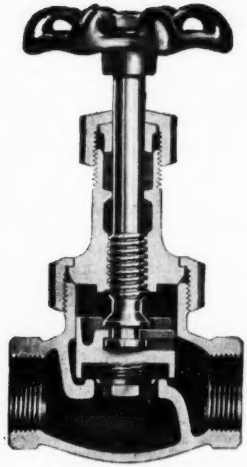
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

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valves and fittings

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Better production for world's largest corn packer

● In this progressive Midwestern plant, fresh corn from the husking machine is carried on a Cyclone Chain Drive Spiral Woven Conveyor Belt through continuous, automatic washing, sorting, processing and inspecting operations. Packer reports results are: reduced labor costs—less manual labor—better product quality.

Cyclone Metal Conveyor Belts are adaptable to a great variety of food—and other manufacturing plant—operating conditions, whether large or small. Our engineers will advise you on which of the three belt types—Spiral Woven, Flat Wire and Flex-Grid—is right for your processing bottleneck. Send to Dept. H-52 for a free copy of Catalog #4.

U·S·S CYCLONE METAL CONVEYOR BELTS

CYCLONE FENCE DEPT.
AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY
WAUKEGAN, ILLINOIS

USS

UNITED STATES STEEL

Deland to Cincinnati and Boston. The juice is expressed from abraded whole fruit and partially sterilized under Sperti ultra-violet lamps. Institutum Divi Thomae, a cancer research group, is running the operation.

This year almost all concentrators are troubled with an unusually large number of pectic enzymes in their juice. Many have already gone to partial heat inactivation to prevent product gelation and separation troubles. Some are flash heating raw juice and others 25-30 Brix range concentrate with open steam or external exchangers—a minimum of 145-160 deg. F. for 3 to 10 sec. before flash cooling—this cutting the enzyme activity by about 50 percent.

Bordo Product Co.'s aseptic canning pilot plant has been moved from Winter Haven to Florence Foods in Florencevilla. This latter plant is turning out about 44 6-oz. cans of concentrate per minute (sold to be stored at 40 deg. F.) for Bordo's market test. Votators are used to heat the concentrate to 200 deg. F. for 48 sec. before cooling. Bordo now has a 250-can per minute unit on order from James Dole Engineering Co.

Pasco Packing, of Dade City, is piloting a special packaging run for concentrate—small pouch-like polyethylene bags now being used to hold 2½-oz. frozen for individual drug store servings. Pasco will pack 48 to a case and sell to a large drug chain.

A pilot Step-Freeze concentrating unit has been reinstalled in Orlando by Commonwealth Engineering. Reports on the resultant concentrate indicate a top-grade product.

Adulteration of Cheese

Some cheese products seized by Food & Drug Administration early this year were judged as "adulterated" and then "misbranded" by reason of a chemical used in the wrapper that was employed.

Dehydroacetic acid had been used in the transparent wrapper employed, and small quantities of this acid were found to have migrated into the cheese itself. The chemical had been used to prevent moldgrowth on the wrapped product.

The adulteration was termed due to an "added poisonous or deleterious substance" which could be "avoided by good manufacturing practice." The misbranding was described as failure to conform with standardized product since an additional substance not recognized in the standard was present in the cheese.

Toxicity of dehydroacetic acid was said to be "similar to that of carbolic acid." It was admitted that the

. . . but are they reaching for your products?

Fibre Cans

Folding Cartons

It depends upon the package—in these self-service days! And that's why so many food manufacturers depend on Ritchie. They know that Ritchie packages are styled to catch the shopper's eye, and start her hand a-reaching. They know, too, that Ritchie packages are practical—that they pack and stack and protect what's in them. Don't you want to talk to Ritchie? It will get more people reaching for *your* products!

HAND YOUR PACKAGING PROBLEM TO W. C. Ritchie AND COMPANY

8830 Baltimore Ave., Chicago 17

New York, Los Angeles, Detroit, Dallas, Denver, Providence, St. Louis, Cleveland, Seattle, Jacksonville.

SEND FOR THIS VALUABLE FREE BOOK!

"101 Ways to Get Better Packaging"—it's yours for the asking. Also gives complete information on Ritchie's broad service and line: Folding Cartons, Set-up Boxes, Fibre Cans, Transparent Packages, Paper Spools, Tubes, Cores, Point-of-Purchase Displays and Dispensers. Write today!

WATEROUS 100% SANITARY PUMPS

Flow settings on a WATEROUS Sanitary Pump stay constant. Internal clearances are fixed . . . there is no metal to metal contact between rotors and housing. There is no aeration . . . no squeezing of the product. From the moment the pump is started to the moment it is stopped, output volume remains constant. This positive control of volume is of vital importance in product transfer and accurate blending and mixing operations.

Easy to take down and easy to clean, WATEROUS Sanitary Pumps meet all 3A standards for sanitation. Thin, viscous or semi-solid materials are handled with equal ease.

Write for Complete Information, TODAY!

Waterous DEPENDABLE PUMPS SINCE 1886

WATEROUS COMPANY
80 EAST FILLMORE AVE.
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FOOD PLANT FLOORS...

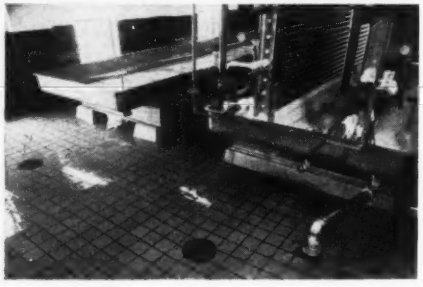
Sanitary, Acid-proof, and they withstand Mechanical Punishment

EL-CHEM Floors of acid-*proof* brick, joined with Lecite, furan resin cement, are:

SANITARY — Too dense to permit bacterial growth or food penetration. Easily cleaned and immune to acid or alkali cleaners, hot water and steam, as well as to oils, fats and greases.

STRONG — At least as sturdy as concrete, they withstand abrasion and other mechanical punishment — and since they are acid-*proof*, they don't menace your building structure.

With more than thirty-five years experience in dealing with every kind of industrial acid-proofing problem, EL-CHEM engineers are ready to survey *your* special problem, make recommendations and prepare plans and estimates — without obligation. Write for illustrated technical bulletin.

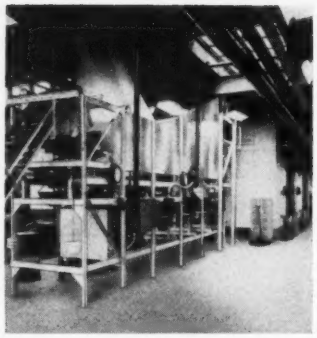


Lecite and quarry tile floor in cooling room of an eastern brewery

ELectro CHEMical Co. — Engineering & Manufacturing Co.

756-A Broad Street, Emmaus, Pa.

Manufacturers of acid- and alkali-proof cements, linings and coatings since 1912



Spuds—Fryer to Freezer

Potato slices enter this continuous unit from paddle elevator (left), pass through fryer (center), and are conveyed to freezer tunnel (right rear). These new facilities were engineered and installed at Brock & Co., Inc., Philadelphia, to boost company's production of frozen French fried potatoes.

quantity found in the cheese was not enough to "render it injurious to health," but the margin of safety was very narrow, far less than the safety factor of 100-fold usually recommended.

Latest Company Earnings

Higher sales but lower profits continue to be reported by food companies. Ten firms list their 1951 records as follows:

	Sales, Net in Millions		Profits, Net in Millions	
	1951	1950	1951	1950
A. E. Staley Mfg. Co.	$156	$118	$3.7	$4.7
American Home Products Corp.	207	178	11.6	11.8
Beech-Nut Packing Co.	74	69	3.9	4.8
Borden Co.	732	631	18.1	20.1
Corn Products Refining Co.	194	187	15.2	23.0
National Biscuit Co.	330	296	16.2	21.1
National Dairy Products Corp.	1,038	907	26.0	32.7
Pepsi-Cola Co.	30	24	2.6	1.3
Standard Brands, Inc.	343	301	9.5	10.2
Sunshine Biscuits, Inc.	124	105	6.2	7.4

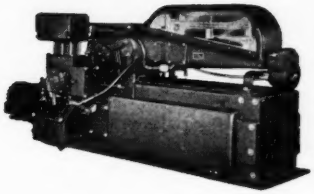
New Synthetic Vitamin

Three Public Health Service scientists have succeeded in synthetically producing a pure crystalline form of vitamin B_6, which is expected to be an important tool in the research battle against cancer.

The new product is pyridoxamine phosphate, a potent form of vitamin B_6 present in meats, cereals, and yeast. The body employs this vitamin—combined with phosphorus—to make proper use of amino acids, the build-

W&T MERCHEN WEIGH FEEDERS

Give Greater Product Uniformity



Weigh-blending of food ingredients—the only *accurate* way to blend—calls for precision equipment and "know-how".

W&T Merchen Weigh Feeders meet the first of these requirements with these features:

- Feed and weigh in *one* operation
- Handle ounces to hundreds of pounds per minute
- Manual or automatic control
- Easy accessibility
- Handy feed register
- Meet underwriters class II group G specifications

Your W&T Representative brings you the "know-how" from his experience in supervising and servicing hundreds of Merchen Weigh Feeder Installations.

Write today for Descriptive Bulletins.

WALLACE & TIERNAN COMPANY, INC.

NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

Send us a sample of any stock you want to PULVERIZE

You will receive an Engineering Report based on our Test Grind with the

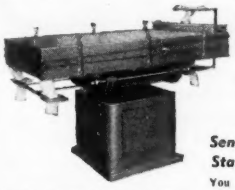
SCHUTZ-O'NEILL PULVERIZER

Do you have a production problem on stocks you grind, to get desired uniformity or fineness? Are you looking for increased output with a cost reducing method? Profit by Schutz-O'Neill's experience of almost 60 years in the rapid, dustless, accurate pulverizing of any dry, non-gritty, grindable stock. Your acceptance of this offer for a test grind does not obligate you. Schutz-O'Neill pulverizers are made in 6 sizes with capacities up to 3000 lbs. per hour.

Catch tramp iron or steel

with a Schutz-O'Neill **SUPER-MAGNET**

Standard equipment on feeders for Schutz-O'Neill Pulverizers.



The Schutz-O'Neill Gyrator Sifter turns out a large volume of uniform, clean products. 1 to 3 sieve frames for single or multiple separation.

The finest development of Centrifugal air-force pulverizing

For extremely fine grinding and uniformity of product, the principle of centrifugal impact with product carried by the air stream, has never been surpassed. Schutz-O'Neill Pulverizers utilize this principle to the fullest degree.

Send us stock sample
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You will receive your pulverized stock plus our Engineering Report giving recommended equipment, methods and mill plans. Literature upon request.

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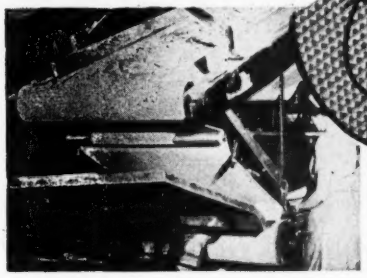

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VICTOR 475

Food Conveyor Belting

Been looking for a conveyor belting that's tough . . . resilient . . . sanitary . . . long-lasting? Here's your answer: Victor 475 Food Conveyor Belting. It's a solid woven cotton belt completely impregnated with Neoprene. It's odorless . . . can't pick up small particles, and resists vegetable, mineral, and fruit acids and oils . . . can be quickly cleaned with hot water or steam.

Food processors the country over DEMAND Victor 475 Food Conveyor Belting. Try it . . . and you'll see why. Send for Bulletin #18.

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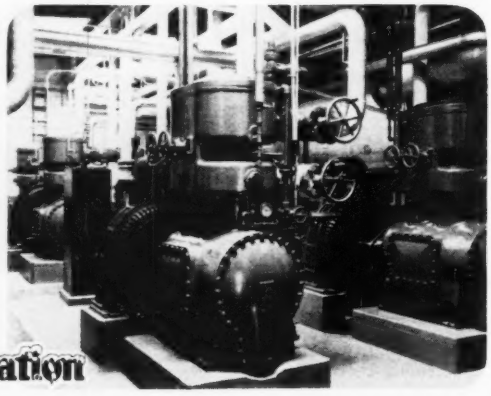
Horseheads, N. Y. or 98 Frelinghuysen Ave., Newark, N. J.

Four of Seven Frick Ammonia Booster Compressors in Service at the Fairmont Canning Plant, Fairmont, Minn.



FRICK Refrigeration

Serves Fairmont Canning Company

This famous Minnesota producer of frozen food uses eleven large Frick booster compressors, and six Frick second-stage machines, in its various plants, for maintaining low temperatures with economy and dependability.

The really important jobs – whether air conditioning, ice making, food freezing or other cooling work – call for Frick Refrigeration.

DEPENDABLE REFRIGERATION SINCE 1882 — FRICK CO. — WAYNESBORO, PENNA. U.S.A.

ing blocks of proteins. Cancer tissue has a very low level of vitamin B_6. Also, such tissue uses amino acids in a way different from normal tissue.

As the first step in the new process, purified pyridoxamine is reacted with anhydrous phosphoric acid, producing a mixture of compounds very similar chemically. This crude mixture is then fractionated (separated into its components) by an ion-exchange chromatographic column—a tall glass tube filled with an ion-exchange resin as an absorbent. Pure pyridoxamine phosphate is finally crystallized from one of these fractions.

The scientists who synthesized the new product are Dr. Elbert A. Peterson, Dr. Herbert A. Sober, and Dr. Alton Meister, all of the Laboratory of Biochemistry at the Cancer Institute of the National Institute of Health in Bethesda, Md.

'51 Dairy Picture

U. S. output of dairy products during 1951 didn't follow any well defined pattern, though several records were broken.

Production of both Swiss cheese and plain condensed milk were the highest ever recorded. And cream cheese hit its second best year during '51.

The table below details how each product fared in comparison with the 1945-'49 average and 1950.

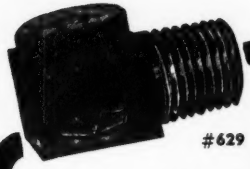
Item	Percent Output Change in 1951 From '45-'49 av.	'50
Total cheese	+ 1	− 3
American cheese	− 2	− 3
Swiss cheese	+52	+ 1
Limburger cheese	−20	+ 8
Cream cheese	+11	+ 1
Blue mold cheese	−49	−32
Creamery butter	− 6	−12
Ice cream	− 3	+ 3
Sherbet	−9	+21
Evaporated milk	−10	+ 1
Condensed milk (sw.)	−54	− 4
Condensed milk (plain)	+42	+ 3
Condensed skim milk (sw.)	−54	+ 2
Dried whole milk	−25	+ 5

Fishing-Ground Bonanza

Re-discovery of the swift stream of icy water known as the Humboldt Current, off the coast of Chile and Peru, is rapidly improving food standards and export trade in these countries.

Long neglected, this stream has now become one of the great new fishing grounds of the world. It supports a wealth of seafood, hence is causing

LESS CLOGGING WITH MONARCH



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In many Food Processing plants Monarch Spray Nozzles are used to . . . .

Wax Fruits
Rinse Vegetables
Powder Milk
Dry Eggs
Wash Filter Cake
Humidify
Banana Rooms

Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

Send for Catalogs 6 A and 6 C

MONARCH MFG. WKS., INC.
2517 E. Ontario Street
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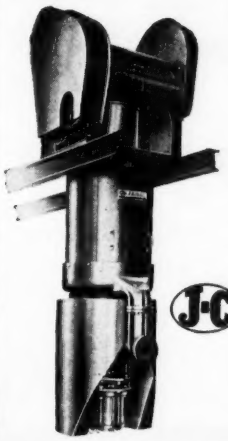
HAVING PRESSING PROBLEMS?

LET US HELP YOU AS WE HAVE HELPED THE FOLLOWING INDUSTRIES:



PAPER PULP: Ultra High Density bleaching-de-inking-concentrated black liquor recovery.
CANNERIES: Juice extractions from pulp.
VISCOSE: Optimum press ratios in continuously pressing alkali from cellulose.
CORN STARCH PLANTS: Dewatering germ and fibre.
POTATO STARCH PLANTS: Dewatering pomace.
RECLAIM RUBBER: Drier product (15 to 20% moisture). Low cellulose content.
GLUE PLANTS: Maximum grease recovery and drier pulp.

J-C

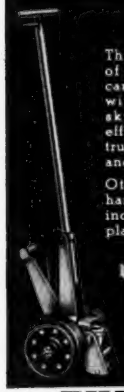
J-C ZENITH PULP PRESSES CONTINUOUS AND AUTOMATIC

Are stepping up profits through improved pressing efficiency. For applications to individual problems, for engineering or performance data, write Jackson & Church Company, Department D, at Saginaw, Michigan.

A PRODUCT OF
JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN
"Work well done since '81"

In Materials-Handling the Colson® LIFT-JACK System

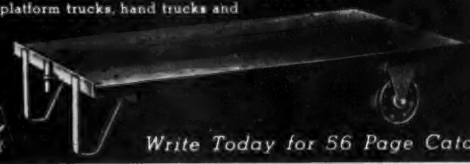
Lets 1 man do the work of 2



Through production, in and out of storage, on and off freight cars or trucks, Colson Lift-Jacks with wood or steel semi-live skids can easily double the efficiency of conventional hand trucks. You save time, money and space.

Other cost-saving materials-handling equipment by Colson includes drum and barrel trucks, platform trucks, hand trucks and precision built roll-easy wheels and casters for every type of industrial application.

Why not consult a Colson engineer to see how up to date materials-handling equipment can speed up your operations and lower your costs. Write us or consult your phone book for the Colson Representative near you.



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FLEXIBLE STEEL CONVEYOR BELTING

Processing, packing, shipping—all are easier and more quickly and economically accomplished with rugged LaPorte Belting. Here is versatile equipment that steps up every food handling operation from loading hopper to shipping room . . . and is built to withstand years of the heaviest use and abuse.

The FLEXIBILITY of LaPorte Belting means that belt grips friction drum tightly over its entire surface. No creeping, weaving or jumping! Provides flat, safe surface for containers empty or filled! *Durable Steel Mesh Construction* facilitates cleaning . . . permits circulation of air and liquids around products in process. Highly resistant to heat and cold. Find out about the many advantages of LaPorte Belting.

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BUY U.S. SECURITY BONDS NOW!

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Schedule of Events

May

22–24—American Society for Quality Control, 6th annual convention; Onondaga War Memorial Building, Syracuse, N. Y.

25–28—Flavoring Extract Manufacturers' Assn., 43rd annual convention; Edgewater Beach Hotel, Chicago.

June

1–5—National Confectioners Assn., 69th annual convention and 26th Confectionery Industries Exposition; Conrad Hilton Hotel, Chicago.

8–11—Institute of Food Technologists, annual meeting; Convention Hall, Grand Rapids, Mich.

9–13—3rd annual conference on Industrial Research. Theme: "The Design of Research Operations"; Columbia U., New York City.

9–21—International Organization for Standardization, triennial meeting; Columbia U., New York City.

10–12—Produce Prepackaging Assn., 2nd annual conference and exposition; Neil House, Columbus, Ohio.

16–July 3—Short course in food technology; Massachusetts Institute of Technology, Cambridge, Mass.

24–26—American Dairy Science Assn., annual meeting; Davis (Calif.) Campus, U. of California.

25–28—National Macaroni Manufacturers' Assn., annual convention; Montreal, Canada.

a tremendous boon to fishermen, canners, and industry in general.

Richness of the stream is credited to the minerals washed into it from rivers of the Andes. Nitrates and phosphates provide nourishment to the bio-marine life, with sunlight as a catalyst. Then the tiny microscopic life feeds in turn on this rich growth-source. Finally all types of fish thrive in the "live" waters.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Flaxseed, revised, proposed, will not be amended "at this time", p. 2284, Mar. 15 *Federal Register*.

Maple syrup, revised, proposed, will not be amended until there is "further work with the industry in the various producing areas", p. 2265, Mar. 19 *Federal Register*.

Poultry grading and inspection, further amendments proposed, p. 2432, Mar. 21 *Federal Register*, written comments received until Apr. 5.

Egg products inspection, revised, p. 2805, Apr. 1 *Federal Register*, effective on publication Apr. 1.

Peaches, revised, proposed, p. 2891, Apr. 3 *Federal Register*, written comments received until May 3.

a Better CLOSURE FOR SMALL PAPER BAGS

Dubl-Tape Closure

It's FAST... NEAT... EASY... ECONOMICAL

Note the neat, uniform stitching of the Dubl-Tape closure. The two strong tapes give double safety, yet the bag is easy to open.

HERE'S the way to close small paper bags economically and efficiently. Union Special's Style 60000 D machine, producing the exclusive Dubl-Tape closure, is designed to speed packaging...cut costs ...and improve appearance.

- **FAST**—Speed to match output of standard filling and weighing equipment.
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Write for BULLETIN No. 100 to get the complete facts on this machine...and how it can do a *better* closing job for you.

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heart of the strainer

A high-grade, woven Monel wire screen is the heart of the Yarway Strainer—one reason why hundreds of thousands of these strainers are policing pipe lines in nearly every industry.

OTHER REASONS—

- cadmium plated bodies and screen caps
- straight threads, machined faces and spark-plug-type gaskets on screen caps
- ten sizes from ¼" to 3"

Sold by 216 industrial distributors. Write for Bulletin S-203.

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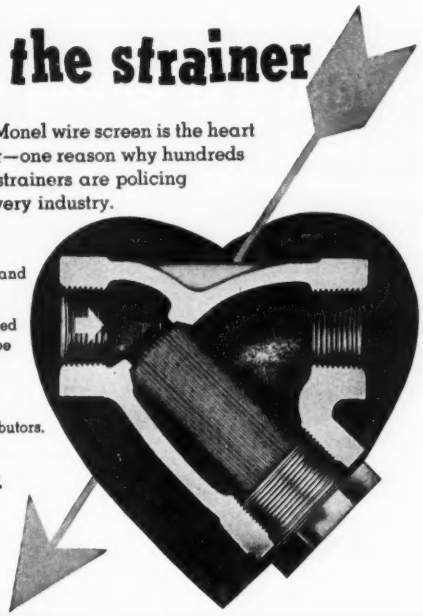
Philadelphia 18, Pa.



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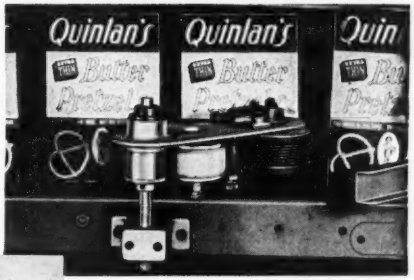
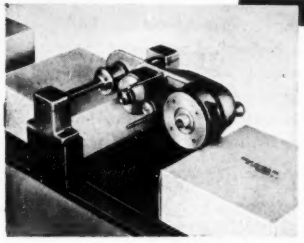
Now...spot-registered imprints on small cartons, cans, canisters

NEW ROLACODER 401





Why make a job out of marking? Let this new precision-engineered ROLACODER 401 imprinting machine mark code-dates, contents identifications, etc. on your package *automatically*. It's compact, versatile, designed for easy attachment to existing packaging or conveying equipment. Makes a single accurately-located imprint on any package with imprinting surface of 1¾" to 6¾". Friction-actuated . . . engineered for long-term efficiency on high-speed lines. Uniformly clean imprints assured by twin-roll ink transfer system and new Metalok diewheel that locks type securely, prevents slippage or movement.

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MIDWEST PACKING COMPANY

This Viking Pump moves 12,000 lbs. of ground fat per hour, 17 hours a day, up 3 stories to rendering tanks.

The job of moving ground fat up three floors, from the grinder to the rendering tanks, was a problem at a midwestern packing company. Eight men, hopper trucks and an elevator were required. The solution was installation of a Viking Pump on the grinder discharge and delivering the fat through a 6-inch pipe up the three stories to the tanks. If you have a pumping problem write for bulletin D100E and E100E.

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Cedar Falls, Iowa

MAKES SURE THERE'S

NO GUESSWORK
IN *YOUR* DRYER APPLICATION

Test drying in our "pilot" plant is a good example of the engineering thoroughness and progressiveness you may expect from Standard. Test dryer may be adjusted to duplicate performance of any type rotary dryer. You learn in advance the exact requirements for your final dryer application. For full information on "pilot" drying and the more than 30 types of Standard-Hersey Dryers available for the process industries, write today for DRYER BULLETIN 508.

STANDARD HERSEY *Dryers*

STANDARD STEEL CORPORATION
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easier *smokehouse* **cleaning**

Now . . . a stubborn dirt job can be finished better and faster with Metso Cleaners. Metso's properly balanced alkali and silica penetrate grease and dirt deposits in less time.

Compare the results in your plant.

Philadelphia Quartz Company
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METSO

metso *cleaners*

Food Engineering Pioneer

Emil Domingo is the first to be awarded a Professional Engineer's rating from the state of New York as a food engineer. Instrumental in persuading the Board of Examiners on the importance of this new technical field was FE's April '51 article, "Why FI Becomes Food Engineering." Mr. Domingo is a consultant, with his office in New York City.

Table grapes, revised, proposed, p. 2888, Apr. 3 *Federal Register*, written comments received until May 3.

Milled rice, revised, proposed, p. 2999, Apr. 5 *Federal Register*, written comments received until May 5.

Canned concentrated orange juice, second revision, proposed, deadline for written comments extended from Mar. 22 to June 1, p. 3064, Apr. 8 *Federal Register*.

F&DA Food Standards

Final order for the amendment to *fruit preserves, jellies, and butters* was published in Mar. 26 *Federal Register*, p. 2596. Dextrose was added to the list of optional sweetening ingredients without label declaration up to a maximum of 25 percent of total sweeteners. Effective date of the amended standards will be June 24.

Ice cream standards hearing has continued to make slow progress. Early April saw the resumption of the hearing, after an extension in the recess due to illness of one of the industrial spokesmen. Cross-examination of witnesses on harmlessness of surface-active agents was slated to begin again on Apr. 21, to complete the hearing.

Final orders on *bread* and *frozen fruits* were expected very soon. No other major development in the Food & Drug Administration's food standards program appeared to be imminent in early April.

Instruments Catalyze Progress

—Continued from page 81

compete with vegetable oil products. This has resulted in new and often unfamiliar equipment—such as bleachers, hydrogenators, and deodorizers—in many lard-processing lines.

An advanced process of this type, at E. Kahn Sons Co., Cincinnati, has been reported in a FOOD ENGINEERING Picture-Flowsheet (pp. 136-139, Aug. '51). Following this diagram reveals that unusual instrumentation plays a key role. Particularly interesting is the way controls direct the performance of the new Girdler five-stage, semi-continuous deodorizer. The automatic cyclic charging and discharging of this unit every 30 min., plus the progressive movement of the fat through each stage, is governed by a Flex-O-Timer motor control. This instrument initiates opening and closing sequences of a series of electric valves. It performs 175 operations in the 150-min. processing cycle.

Another feature of the deodorizer is an electronic instrument which records temperatures in heating and deodorizing trays and controls the flow of Dowtherm for heating. This instrument insures that fat passing through the process is properly treated at a critical, high temperature.

"Balancing" the Deodorizer

One of the first continuous deodorizing processes in the industry recently was placed into operation at Reliable Packing. This employs a converted brandy still. It is performing splendidly, despite widespread belief that such a deodorizer was impractical. The unit is supplied by fat preheated in a Dowtherm unit to 425 deg. F. It operates under a vacuum of 29.75 in. Hg, pulled by a three-stage jet ejector.

The advanced instrument system designed into the deodorizer has much to do with its success. Primary agent in the well-balanced continuous operation is a Ratio-Flow controller that measures incoming fat and steam with two Rotameter pickups. It automatically proportions steam-to-fat flow. Tied in is a Leveltrol which holds a static level in the discharge section by operating outlet and inlet valves.

Reliable now deodorizes continuously, 24 hr. a day, without an operator at the unit.

Several new technics and systems have been developed to improve upon basic batch methods of steam and dry rendering. Some of these—the Titan expulsion system and the Pavia process, for example—are designed to greatly speed the rendering process. And they introduce new critical values which would seem to require unusually precise instrument control.

Other advances in rendering technology involve the use of solvent extraction. The Deatherage process, French's new Azeo Extractor, and the Vio Bin process are examples of this type. In these systems, new problems of proportioning and continuous-flow control appear to challenge the instrument engineer.

Let's take a look at the instrumentation of the first Azeo-Extraction process at Detroit Rendering Co.: No less than 15 important measurements are brought onto the control panel for this process. Involved are Rotameters, manometers, and pressure and temperature controllers. The total extraction cycle of 3½ to 4 hr. is singularly free of manual supervision.

In meat processing, as in many other branches of the industry, there is some distance between the technical progress that is possible and its actual in-plant application. By solving the hazards and simplifying the operation of more complex but better processes, instrumentation rapidly is proving that this gap between theory and practice can and will be closed.

End (Resume reading on page 82)

EVEN AN Egg-
COULD BE PACKAGED ON THIS
WRAPPER
WITHOUT BREAKAGE!
Modern, versatile machine wraps products of every type and description at amazing speeds
up to 120 units PER MINUTE!
We don't suppose eggs will be individually wrapped in Cellophane. But, it does help point out how carefully and yet, how speedily the Campbell Wrapper is packaging products of the most fragile and delicate nature. This modern machine could very easily be the solution to your most difficult packaging problem. Write now, and learn fully how a Campbell Wrapper can be furnished to meet your individual requirements — and greatly increase your wrapping production with decided savings in time, labor and materials.
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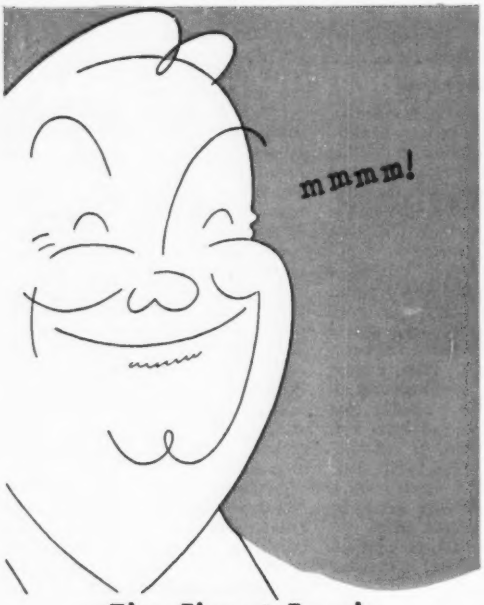
WRAPS PRODUCTS OF ALL TYPES AND SHAPES



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Taste Better
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when you add a little

Huron MSG
MONOSODIUM GLUTAMATE

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Yes, the finest food products can be made to taste even better and be given new taste appeal and more sales appeal with the addition of Huron MSG.

Huron MSG can be added in small quantities to your present formula and no other changes are necessary. The cost can be kept surprisingly low.

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Men & Companies

David L. Clark, Jr., was recently elected president of D. L. Clark Co., Pittsburgh candy maker. He succeeds his brother, Harold S. Clark, now board chairman.

Industry

American Molasses Co. has acquired all outstanding stock of Colonial Molasses Co., Inc., and its subsidiary, Colonial Molasses Co. of La., Inc.

Barricini Candies has named Wallace Cane director of advertising, public relations, and promotion.

Coca-Cola Co., through negotiations conducted by James Farley with the Spanish brewery, El Aguila, expects full-scale production of Coke in Spain shortly.

Granny Goose Foods, Oakland, Calif., producer of potato chips and allied products, recently opened a new plant in Fresno, Calif. Cost: $90,000.

Pacific Brewing & Malting Co., brewer of Wieland's beer, has changed its name officially to Wieland's Brewing Co.

Pacific Pearl Frozen Foods, Inc., has been organized at Seattle by Ivar Wendt to handle quick-freezing of oysters. Reported capitalization: $50,000.

Pfeiffer Food Products, Inc., producer of salad dressings, also a soft drink, and a tartar sauce, has started construction of a new plant in Buffalo. Cost: $100,000.

Quaker Oats plans to build a factory in Brazil and has applied there for exemption from import duties on machinery to be used.

Red Star Yeast & Products Co. has elected Robert T. Foote and James A. Kirkman, Jr., to vice-presidencies. Mr. Foote was also elected a director.

Sao Paulo State Dairy Co-Op., Brazil, has begun construction of a milk-dehydrating plant with designed capacity of approximately 30,000 qt. per 8-hr. shift.

Southern Biscuit Co. has completed construction of additional facilities in Richmond, Va. Cost: $1,000,000.

Sun-Dine, citrus plant of Lake Aldred, Fla., recently suffered a fire causing damage of $820,000.

Utah-Idaho Sugar Co. plans to construct a refinery. Cost is estimated at $9,000,000.

Personnel

Dr. Franklin W. Barber has been appointed head of the Division of Microbiology of National Dairy Research Laboratories, Inc., Oakdale, L. I., N. Y.

Frank R. Bear is now general manager of Shopsy's Foods Ltd., Toronto. His background includes 22 yr. in food canning.

J. G. Boykin has become president and board member of Coca-Cola Bottling Co. of Calif.

John Brandt was recently re-elected president and general manager of Land O'Lakes Creameries, Inc. M. H. Mauritson was elected first vice-president.

R. H. Cronshey is now president of Pacific Dairy & Poultry Assn., succeeding E. H. Teleneus.

Robert C. Becherer is now president of the Link-Belt Co., succeeding George P. Torrence, retired.

Experience Saves Time and Money in

ANALYSIS

OF YOUR SANITATION PROBLEM

An investment in a wise, systematic diagnosis of the sanitary conditions in your plant operations and facilities will eliminate losses due to trial-and-error methods. Greater productive efficiency and effective quality control will result from correct analysis of your problem.

Orkin Institute has a competent staff of experts, which includes sanitation specialists in your field. We are alert to newest materials and methods, changing industry standards and regulatory standards. We are prepared to offer you sound analysis, thorough inspection, constructive development of program, as well as employee training.

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● Cartons or cases of bottles, jars, or cans dumped on table are instantly unscrambled and regimented into a single file to keep a continuous flow of units on your production line. Reduces labor costs . . . minimizes breakage . . . saves floor space . . . and meets all sanitary specifications as operator does not handle mouths of units.

GET THE FACTS NOW!

ARE YOU CHANGING TO GLASS?

Send for Bulletin ST-1 and learn why there are twice as many ISLAND Styl-O-Matic Unscramblers in use than all other makes combined, and how they are used to unscramble practically every type of container imaginable.

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Please send full details on the Styl-O-Matic Unscrambling Tables as described in Bulletin ST-1. Dept. FE-5

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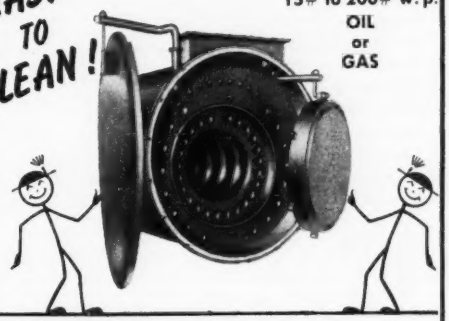
EASY TO CLEAN!

10 to 500 h.p.
15# to 200# w.p.
OIL or GAS



To Completely Expose Furnace and All Tubes . . . Open One-Piece Rear Flue Cover . . .

Then Open One-Piece Rear Baffle. There are Ample Clean-Out Doors in Front End, too!

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Builders of Better Boilers Since 1848

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Typical Food Items SeaKem Products Can Help Improve

Aspics
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Dehydrated Soups
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Flavoring Emulsions
French Dressing
Frozen Fish
Frozen Fresh Fruit
Frozen Fruit Juices
Fruit Fillings (Pie)
Fruit Juices
Fruit Syrups
Glazes
Ice Cream
Marshmallow Toppings
Meringues
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Recent application developments are fast making it apparent that SeaKem "Colloids Out of the Sea" offer countless new opportunities for improving a wide variety of food items (see typical list on left).

In addition to being employed profitably for scores of gelling, binding, bodying, thickening, suspending and stabilizing purposes, SeaKem Products are now being used to improve mouth-feel and flavor . . . increase the efficiency of component ingredients . . . and achieve unique end-product advantages.

Also of growing interest are such developments as the use of SeaKem Products to protect frozen foods from oxidation . . . modify ice-crystal growth in fruits . . . custardize milk and products containing milk solids . . . create thermally-reversible gels . . . and precipitate proteins in processing.

If you are not up to date on how SeaKem "Colloids Out of the Sea" can help improve your food product, your inquiry for the latest Seakem Technical Bulletins is invited. Write today, mentioning the type products and problems with which you are concerned.

FREE SAMPLES FOR YOUR APPRAISAL

Working samples of SeaKem Products for your own laboratory investigation will be gladly supplied on request. Or if you prefer, SEAPLANT Chemical Corporation's Laboratory (where a continuous research program on colloid agents is carried on) will undertake to develop specific recommendations for you — *in complete confidence and without obligation or cost.* Write today.

*SeaKem is the trademark for the standardized, water-soluble, sea plant extractives manufactured by the SEAPLANT Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Odor and flavor are extremely slight or entirely absent. Available in a variety of types suitable for use in an unusually wide range of applications, SeaKem Products have won acceptance on the basis of proven advantages with many of this country's leading food manufacturers and processors.

SEAPLANT
CHEMICAL CORPORATION
SERVING INDUSTRY WITH "COLLOIDS OUT OF THE SEA"
63 David Street, New Bedford, Massachusetts

Clinton H. Haskell

William G. Karnes

Haskell of Beatrice Passes; Succeeded by Karnes

Clinton H. Haskell, 63, president of Beatrice Foods Co., died Mar. 21 and William G. Karnes has been elected by the company's board as his successor.

Mr. Haskell began his career in the Topeka branch of Beatrice—then headed by his father—at the age of 17. Through successive stages he finally moved to Chicago, becoming assistant general manager in 1923. In 1928 he became president. Under his leadership, Beatrice became one of the foremost companies in the dairy industry.

His successor, Mr. Karnes, joined the company's legal department in 1936. In 1943 he became vice-president and in June 1947 was elected a director. He is also a director of the Milk Industry Foundation and the International Assn. of Ice Cream Manufacturers.

N. W. Embry has been elected board chairman of the General Box Co., Des Plaines, Ill. He succeeds E. E. Ames, who continues as company director.

James R. Farris has been named merchandising manager for the Calumet Div. of General Foods.

Harry H. Filler is now manager of manufacturing in all plants of the Rheem Mfg. Co., maker of steel shipping containers and water heaters.

A. L. Jones has been appointed manager of the Water Treating Div. of Worthington Pump & Machinery Corp.

Roger M. Kirk, Jr., has been named national sales manager of the John H. Dulany & Son, Inc., frozen food division. He leaves Standard Brands.

Delmar H. Larsen has opened offices in Los Angeles as a consulting chemist, chemical engineer, and patent agent.

Earl M. Nielson has resigned as president of California Tuna Canning Co. (Caltuna) to devote time to his interests in Costa Rica.

Dr. John H. Payne, head of sugar technology department, Hawaiian Sugar Planters' Assn. experiment station, is new 1952 president of Hawaiian Sugar Technologists.

Louis A. Petri, president and general manager of Petri Wine Co., San Francisco, has been elected president of the Wine Institute.

Edwin Philip Pfeiffer is now vice-president in charge of production for Pfeiffer Food Products, Inc.

N. W. Postweiler, formerly packaging engineer with National Biscuit Co., is now sales engineer for Alford Carton Div. of Continental Paper Co., Richfield Park, N. Y.

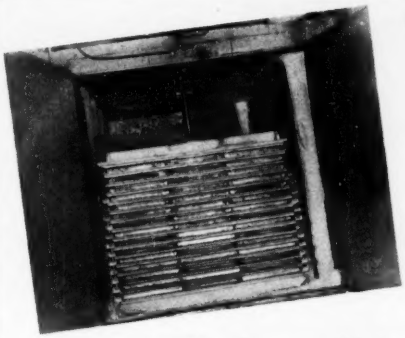
Miss Jessie May Smith has been appointed administrative assistant to the president of the American Resinous Chemicals Corp., Peabody, Mass.

C. L. Snavely, of the Consumers Packing Co., Lancaster, Pa., is new president of the National Assn. of Frozen Food Packers.

Associated Industry

Babcock & Wilcox Co. has received an equipment order for Israel's first sugar refinery. Refining of 150 metric tons of sugar per day from imported cane is planned.

Ball Brothers Co., Inc., announces election of three new board members: John P. Collett, Robert W. Biggs, and James L. Knipe.



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five days a week for our complete freezing operations of our Econopak fryers and our Ocoma chicken parts.

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The Faster the Freeze the Finer the Product

"Amerios" freeze quickly, insuring full flavor and quality retention, whether it be Poultry, Meat, Fish, Fruit or Vegetable. Top and bottom contacts with hydraulic control assure uniform freezing throughout. You get flat, uniform packages so essential for stable storing in dispensing units. The economy of operation is outstanding; maintenance costs practically zero.

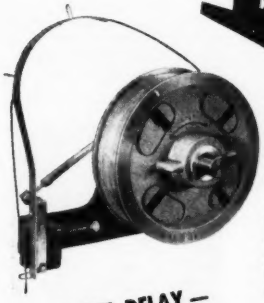
Designed For Ammonia, Brine or Freon Refrigerant

Amerio
Contact Plate Freezers Inc.
Union City, N. J.
"It's the Contacts that Count"

Send For Illustrated Brochure

If you really want to cut stitching costs . . .

THIS 30-DAY FREE TRIAL OFFER WILL SHOW YOU HOW!



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one, two or even twenty New Inland All-Metal Lifetime Automatic Wire Spools for 25 lb. coils — for 30 days without obligation.

TO USE —
with Inland Speed-Flo Wire on your stitching machines — your work — under your operating conditions. There will be no cost or rental on the spool.

THIS REMARKABLE SPOOL —
will use every inch of wire on the spool — eliminate wire trouble — and give you improved stitching with a saving in time and wire.

DON'T DELAY —
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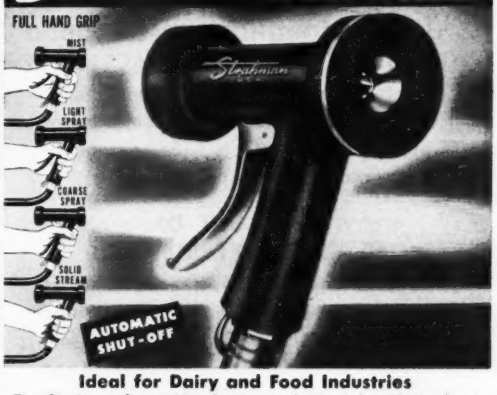
Strahman AUTOMATIC WATER-SAVER SPRAY NOZZLE



Ideal for Dairy and Food Industries

The Strahman Spray Nozzle does a better job with the least amount of water. This precision made nozzle enables the operator to get any type stream of water to do his job by simply pressing the lever. A soft spray is sent forth with slight pressure on the lever, and a strong straight stream may be had by pushing the lever all the way down. This convenient control of the wash water assures better cleaning with a lot less effort. The nozzle automatically shuts off the moment the lever is released, thereby eliminating all waste of water. *List Price $17.50*

RENEWABLE RUBBER COVER. The sturdy cover protects the nozzle and your equipment against knocks and dents. When the cover becomes worn, replace it with a new one.

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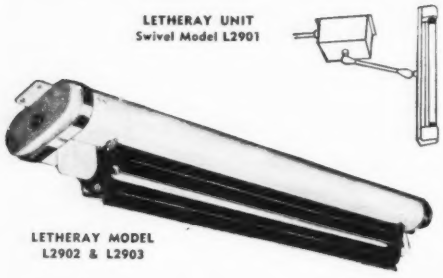
STOP COSTLY SPOILAGE

WITH

HANOVIA ULTRAVIOLET LAMPS

LETHERAY UNIT
Swivel Model L2901



LETHERAY MODEL
L2902 & L2903

Destroy spores and other micro-organisms which cause spoilage. Destroy them right in the air and on surfaces. Hanovia germicidal lamps insure against loss of profits caused by product contamination.

USED THROUGHOUT THE FOOD INDUSTRY WITH SATISFACTION

Meat packers, bakers, and packers of perishable foodstuffs use germicidal lamps to protect their products from contamination at various steps in production.

THE RESULT OF 40 YEARS EXPERIENCE

Hanovia equipment is the outcome of forty years of research, development and experience in the art of manufacturing ultraviolet lamps for industry, the home and the medical profession. Hanovia's engineers will study individual requirements and make recommendations for any installation either small or large *without obligation.*

Write for complete information

GERMICIDAL SALES DIVISION

HANOVIA CHEMICAL & MFG. CO.
DEPT. C-5, NEWARK, N. J.

Herbert L. Barnet, vice-president in charge of domestic operations for Pepsi-Cola Co., has been elected a director of the company.

Barber-Colman Co., Rockford, Ill., will purchase principal assets of Wheelco Instruments Co., Chicago, maker of indicating, recording, and control instruments.

Bemis Bro. Bag Co. has established a new research and development department to extend activities in package design and engineering. It is headed by H. V. Kindseth.

International Paper Co. announces election of Harvey P. Hood and John M. Kingsley to its board.

W. A. Jones Foundry & Machine Co. has elected Thomas A. Jones as president. He is grandson of W. A. Jones, founder of company in 1890.

Labline, Inc., has been formed in Chicago for manufacture of laboratory apparatus, instruments, and equipment. Alexander I. Newman, president, was formerly president of Precision Scientific Co.

Arthur D. Little, Inc., consulting research and engineering firm of Cambridge, Mass., has named Allen Latham, Jr., as a vice-president.

Nashua Gummed & Coated Paper Co. has officially changed its name to Nashua Corp.

National Container Corp., producer of corrugated and solid fiber boxes, is opening a corrugated box plant in Rock Hill, S. C.

Niagara Filter Corp., Buffalo, has appointed Erhardt R. Bach and Fred E. Herstein sales and engineering representatives.

Swartwout Co. announces appointment of the firm, Mercator de Mexico, S. A., to act as its sales and engineering representatives in Mexico.

Worthington Pump & Machinery Corp. stockholders recently re-elected their entire board of directors and voted to change the company's name to Worthington Corp.

Deaths

Harry A. Cronk, 73, former president and chairman of Farm Products Div. of the Borden Co. Credited with pioneering the use of paper milk containers, he also founded the Milk Research Council in 1931 and was its president many years.—Mar. 26.

Chester Mason Gould, 70, president of Corona (Calif.) Citrus Assn.—Feb. 29.

William B. Harris, 80, former president of William B. Harris Coffee Co., Inc., N. Y., and past executive of NAM. —Mar. 4.

George D. Hopkins, 78, who rose in meat packing industry to become secretary of Wilson & Co. from 1917 to retirement in 1949.—Mar. 25.

Phil Huber, 63, co-founder and board chairman of Ex-Cell-O Corp., maker of precision machinery.—Feb. 7.

Charles H. Kraft, 71, past vice-president of The Kraft Foods Co. He assisted in company's growth from organization of Kraft brothers to its present employment of 11,000. —Mar. 25.

Howard Marshutz, 54, supervisor of waterproof sales for Bemis Bro. Bag Co.—Mar. 10.

Walter J. Spray, 87, founder of Spray Coffee and Spice Co. —Mar. 12.

John W. Steinhart, 90, founder of Otoe Food Products Co., Nebraska City, Neb., and prominent in canning industry since 1891.—Apr. 3.

Paul W. Hodler is head of newly created Products Control Dept. of Loblaw, Inc., with headquarters in Buffalo.

SPRAY NOZZLES... two guides to proper selection!

No matter what you may face in the way of a spraying problem, it can be solved quickly and at low cost with Spraying Systems Spray Nozzles. Two fact-packed catalogs—No. 22, General Industrial Spray Nozzles, and No. 23, Pneumatic Atomizing Nozzles—are yours for the asking. They show you all the various types of spray nozzles available . . . explain design and construction . . . and outline spray characteristics such as atomization, impact of spray and capacity. Write for your copies today.

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See That Your Ounce Packages Are Dressed Their Best!

Let Brown Packets help you build profitable sales of Granulated Sugar, Salt, Plain Gelatine, Prepared Hot Chocolate and Cocoa, Pudding Mixes, Coffee, Baby Cereals and Flavored Soft Drink Powders.

Ask for a Brown Packet quotation, or send us a small quantity of your product with your order for sample packeting.

Manufacturers of Packeting Machinery, Packets and Open End Envelopes.

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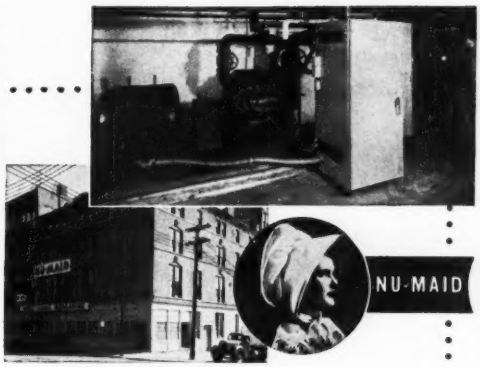
Representative: Burnard C. York Packaging Machinery, 5807 West North Avenue, Chicago 39, Illinois

West Coast Representatives: Peter D. Bowley & Assoc., 210 Mississippi Street, San Francisco, Calif.



as The Miami Margarine Company expands...

It's VILTER Again—

Refrigeration plays an important part in the processing and storing of Margarine—and The Miami Margarine Company of Cincinnati has known for over twenty years that they can depend on Vilter refrigeration. As demand for their Nu-Maid "Table Grade" Margarine has increased, Miami has been faced with the problem of increasing production in limited available space.

Vilter engineers worked with Miami to plan a consolidation of their refrigeration equipment. The only available space was a relatively small room on the fourth floor, with a bare seven feet of headroom. Direct-connected Vilter VMC compressors proved the solution to the problem. They provided greatly increased capacity with one-half the floor loading of other types of machines, and mounted on cork, produced no objectionable vibration. So successful was the first VMC installation, a second was made a year later. With this Vilter equipment, the refrigeration room will be able to accommodate four times the original estimated capacity.

Food processors—and other users of refrigeration—the country over have found time and time again that the experience of Vilter engineers and the design of Vilter equipment have helped them solve refrigeration problems and save money. More than that, they experience lower costs of operation, less maintenance, and greater freedom from costly "down-time" when they use Vilter refrigeration equipment.

Vilter

Your nearby Vilter Representative or Distributor will be glad to show you how you can save money with Vilter.

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THE VILTER MANUFACTURING COMPANY
MILWAUKEE 7, WISCONSIN
Ammonia and Freon Compressors • Pakicers • Evaporative and Shell & Tube Condensers • Pipe Coils • Valves and Fittings • Air Conditioning

NEW GUARANTEE OF "GOODNESS"

METALLIC CONTAMINATION SPOILS "GOODNESS"

Food processors know that the metallic contamination found in most process water and containers spoils natural "goodness." It produces "tinny" taste, discoloration, cloudiness and off-color. It promotes rancidity, reduces shelf-life, destroys both fragrance and flavor. Nothing can compensate for such loss.

VERSENE* — SAFE PROTECTION

Now, for the first time, after years of toxicological research, done in accordance with the suggested procedures of the Food and Drug Administration, Bersworth makes Versene available to the food industry for the prevention of metallic ion contamination. When used for this purpose Versene is odorless, colorless and tasteless. Versene is non-toxic and safe when added in the small quantities needed for this purpose. Versene is made only by the Bersworth Chemical Company under processes originated, developed and patented by F. C. Bersworth. Only Versene has been so extensively tested for safety.

VERSENE* — GUARANTOR OF "GOODNESS"

When your good formula, product or process is affected by metallic ion contamination, Versene can insure its continued goodness. Exceptional stability at all temperatures and pH's, plus guaranteed quality and uniformity of manufacture, makes this powerful Chelating (complexing) Agent your safeguard against failure. If you formulate, process or wet-pack fruits, jams, jellies, vinegars, wines, syrups, clear sauces, oils, fats, vitamins, essential oils, or seafoods — investigate Versene for your own protection. Versene also works synergistically with many of the organic compounds widely used to prevent the development of rancidity. Chemical Counsel available. Send for sample and Technical Bulletin No. 2. Write Dept. T

NEW VERSENE WATER TEST KIT. Tells Total Hardness in 2 minutes. Accurate to 1 grain per gal. Versenate method. Complete with instructions $5.00 Postpaid.

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Griffin Chemical Co. — San Francisco — Los Angeles Kraft Chemical Co. — Chicago
Siegel Chemical Co. — Brooklyn, N. Y. C. S. Tanner Co. — Charlotte, N. C.
Barada & Page, Inc. — Dallas — Houston — New Orleans — Oklahoma City
St. Louis — Tulsa — Wichita

Recent Inventions

PRODUCTS

Nut-Like Products Prepared by Soaking and Partially Cooking of Dry Beans, Frying in Oil, Then Roasting to Desired Color and Crispness—*H. J. Morris, Berkeley, Calif. to U. S. A. No. 2,584,150. Feb. 5, 1952.*

Food Products Made by Mixing Rice Meal With Hot Water, Forming Into Elongated Shape and Cooking in Oil at 375-425 deg. F.—*R. L. Roberts, Piedmont, Calif. to U. S. A. No. 2,585,036. Feb. 12, 1952.*

Hydrolized Lactalbumen of High Nutrient Value Made by Adding Non-Toxic Alkaline Material to Lactalbumen Slurry at Temperature and pH to Allow Gelatinization, Adding a Proteolytic Pancreatic Enzyme to Give Product With no More Than 19 Percent Nitrogen in Alpha Amino Form, Clarifying and Drying—*G. H. Carlson, to R. P. Sherer Corp., Detroit. No. 2,585,225. Feb. 12, 1952.*

Nonsogging Pie Crust Mix Comprising Approximately 2 Parts by Weight Flour, 1 Part Shortening, and 0.05-1.00 Percent Dried Egg White—*C. G. Harrel, R. O. Brown, and M. H. Kimball, to General Mills Inc., Minneapolis. No. 2,586,945. Feb. 26, 1952.*

Stabilized Plastic-Type Confection Made by Hydrating Soluble Algin With Cold Water, Mixing With Ingredients, Cooking, Adding Calcium Salt to Convert Algin to Alginate—*J. Alikonis, to Paul F. Beich Co., Bloomington, Ill. No. 2,587,806. Mar. 4, 1952.*

Whipping Composition Comprising Water-Soluble Degraded Soy Protein and Sodium Phosphate—*H. E. Sevall and R. P. Schaeffer, Elgin, Ill. to The Borden Co., New York City. No. 2,588,419. Mar. 11, 1952.*

Improved Coffee Flavor and Product Comprising Substantially 1 Part Asafetida Gum Resin, 4 Parts Powdered Edible Gelatin, 7,000 Parts Roasted Ground Coffee—*E. P. Haney, Winchester, Mass. No. 2,588,922. Mar. 11, 1952.*

Cacao-Milk Beverage Material Made by Mixing 4 Percent by Weight Finely Divided Cacao Powder With Sweetened Milk Concentrated to 38 Percent Solids, Agitating at Coagulating Temperatures, Diluting, Canning, and Sterilizing—*G. Grindrod, Oconomowoc, Wis. No. 2,589,801. Mar. 18, 1952.*

Ice Cream Composition Containing as Stabilizer Cold Water-Soluble Comminuted Scale Material Selected From Group Consisting of Starch Ethers and Starch Esters—*J. Lolkema, Hoogezand, Netherlands to Naamlooze Vennootschap: W. A. Scholten's Chemische Fabrieken, Groningen, Netherlands. No. 2,590,077. Mar. 25, 1952.*

Ready-to-Mix Powder-Base-Foodstuff Containing Soya Modified by Hydrolyzed Vegetable Protein and Cocoa—*E. K. Pettibone, San Francisco. No. 2,590,647. Mar. 25, 1952.*

PACKAGING

Powder Conveying and Discharging Apparatus With Means for Automatically Actuating Discharge Valve by Weight of Product Under Vacuum—*G. P. Hensley, San Francisco and D. O. Johnson, Loleta, Calif. to Golden State Co., Ltd., San Francisco. No. 2,583,648. Jan. 29, 1952.*

Bottle Loading Device Utilizing Tilting Elements Mounted on Oscillatory Horizontally Extending Shaft—*J. B. McCabe and H. A. Strelow, Milwaukee, and R. W. Marty, Waukesha, Wis. to the Heil Co., Milwaukee. No. 2,583,787. Jan. 29, 1952.*

Machine for Closing and Securing Ends of Bag Wrapped About Ultimate Contents as a Tube—*H. G. Allen, Niagara Falls, N. Y. to Savannah Sugar Refining Corp. Savannah, Ga. No. 2,584,529. Feb. 5, 1952.*

Apparatus for Detecting Presence of Metallic Crowns by Passing Container Through Testing Magnetic Field—*G. P. Stout, Baltimore, Md. No. 2,587,664. Mar. 4, 1952.*

Machine for Sealing Filled Bag or Other Flexible Container Consisting of Movable Clamping Cradle That Automatically Receives, Seals, and Discharges Said Bags—*A. E. Almgren, Hillside and J. P. Jakob, Roselle, N. J. to American Can Co., New York City. No. 2,590,081. Mar. 25, 1952.*

PROCESSES

Processing Ripe Olives by Immersing in Tank of Liquid and Introducing Air at Base of Tank to Induce Movement of Olives and Liquid—*R. N. Ball and E. V. Dellen, Visalia, Calif. No. 2,582,371. Jan. 15, 1952.*

Coloring Citrus Fruit in Bath of Oil-Soluble, Water Insoluble Dye Dissolved in a Non-Ionic Surface Active Solvent, Then Diluting With Water—*G. J. Hausmann, Merchantville, N. J., B. S. Johnson, Havertown, and C. W. McDermott, Philadelphia, Pa., to Franklin Research Co., Philadelphia. No. 2,582,868. Jan. 15, 1952.*

Modifying Wheat Gluten by Reacting With Alkaline Earth Metal Oxide in Aqueous Medium for 15-60 min. at 145-155 deg. C.—*J. R. Coffman, St. Paul, Minn., to General Mills, Inc., Minneapolis. No. 2,582,965. Jan. 22, 1952.*

Dextrose Made by Subjecting Aqueous Starch Solution to Microbiological Enzyme Action With Amylolytic Action Equal to at Least 200 SKB Units per 100 g. of Starch and Starch-Glucogenase Action Equal to "k" value of at Least 0.005 per 100 g. Starch—*L. Wallerstein, New York and P. P. Gray, Forest Hills, N. Y., to Wallerstein Co. Inc., New York City. No. 2,583,451. Jan. 22, 1952.*

Dipping Light Colored Food Product in Aqueous Solution of Non-Toxic, Tasteless, Odorless Blue Fluorescent Material From Group of Soluble Organic Sulfonic Acid Compounds, Hydroxycoumarins, and Hydroxycoumarones—*J. DeMent, G. Lamont, and J. Polly, Portland, Ore. No. 2,583,686. Jan. 29, 1952.*

Preserving Flavoring Materials by Contacting With Liquid Nitrogen to Reduce Temperature to −100 deg. F., Comminuting to Particle Size Below 30 Microns, Packaging While Still Impregnated with Nitrogen—*J. L. Hendry, Jr. and R. R. Pederson, Elizabeth, N. J. No. 2,583,697. Jan. 29, 1952.*

Recovering Lactose From Mother Liquor by Diluting to 13-17 Percent Solids, Passing Through Cation and Ion-Exchange Resins, Concentrating First Effluent Fraction by Vacuum Evaporation, Cooling, and Separating Lactose Crystals, Then Utilizing Sweetening-Off Water to Dilute Resultant Mother Liquor and Repeat Cycle—*W. J. Pratt, East Patterson, N. J., H. F. Seibert and R. C. Stribley, Mason, Mich. to Wyeth, Inc., Philadelphia. No. 2,584,158. Feb. 5, 1952.*

EQUIPMENT

Food Freezing Apparatus Comprising Inclined Low-Temperature Liquid-Filled Freezing Tunnel Fed and Discharged Through Air Locks—*W. L. Morrison, Highland Park, Ill. No. 2,582,789. Jan. 15, 1952.*

Heat Exchanger With Flat Plates and One-Piece Gaskets, Flow-Directing Channels and Safe Leakage Feature—*E. K. Kintner, Winnetka, Ill., to The Pfaudler Co., Rochester, N. Y. No. 2,582,871. Jan. 15, 1952.*

Milk Homogenizing Device Consisting of a Flow Chamber Packed with Intercontacting Metal Balls—*A. G. Borck, Tullinge, Germany and C. Gronning, Stockholm, Sweden, to Aktiebolaget Separator, Stockholm. No. 2,583,206. Jan. 22, 1952.*

Food Processing Apparatus Consisting of Continuous Chamber With Helicoidal Container Guideway Which Passes Through a Plurality of Curved Sections Including Rotatable Can Tables—*F. W. Kreuger, Saratoga, Calif. to Food Machinery & Chemical Corp., San Jose. No. 2,584,473. Feb. 5, 1952.*

Fish Aligning and Beheading Machine Utilizing Driven Cleithrum-Engaging-Clip Traveling in Rectilinear Path Towards Knife While Fish is Moved in Opposite Direction by Puller Plate—*W. A. Fonken and E. Auer to Smith Cannery Machinery Co., Seattle, Wash. No. 2,584,567. Feb. 5, 1952.*

Peach Pitting and Slicing Machine in Which Fruit are Fed to Laterally Swinging Blades on Vertical Parallel Disks by Laterally Moving Supporting Cups—*E. Altman, Valdosta, Ga. No. 2,585,073. Feb. 12, 1952.*

Poultry Dipping Machine Utilizing Motor-Driven Vertical Bar Suspending Plurality of Poultry—*J. H. Wagner, Parkville, Md. No. 2,585,194. Feb. 12, 1952.*

Continuous Cooking Unit Consisting of Rotatable, Hollow Member Partly Immersed in Tank of Heated Cooking Fluid and Means for Supplying Small Quantities of Product From Hopper to Member—*G. Ashton, Los Angeles, Calif. No. 2,585,293. Feb. 12, 1952.*

Refrigerated Transit Van With Tubular Frame Structure Holding Eutectic Solution Which Can be Frozen by Circulating Refrigerant—*B. E. Williams to Swift & Co., Chicago. No. 2,585,360. Feb. 12, 1952.*

Doughnut Forming Machine Comprising Endless Chain of Molds Fed Through Rolls From Endless Belt Table—*M. M. Fulmer, Portland, Ore. No. 2,585,379. Feb 12, 1952.*

Two-Section Vacuum Fondant Cooler With Suction Feeding of Product Through Inlet Pipe—*M. M. Guggenheim to National Equipment Corp., New York. No. 2,585,766. Feb. 12, 1952.*

Fish Smoking Apparatus Utilizing Ionizing Network to Electrically Charge Smoke Particles and With Means for Variable Spacing of Trays in Chamber—*G. A. Lawrence, Belfast, Me. No. 2,585,799. Feb. 12, 1952.*

Dough Sheeting Rolls With Cylindrical Surface and Sleeve of Plastic—*H. C. Rhodes, Portland, Ore. to Read Standard Corp., Harrisburg, Pa. No. 2,586,089. Feb. 19, 1952.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

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- **PRODUCES TWICE THE VOLUME** of ordinary pulpers of comparable size.
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Model "A"—25-50 tons per hr. capacity with 10 h.p. motor
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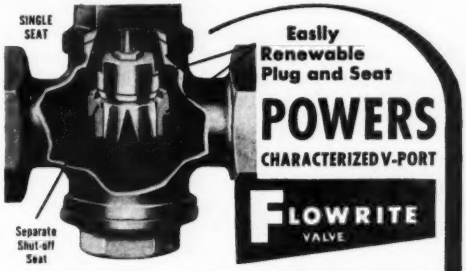

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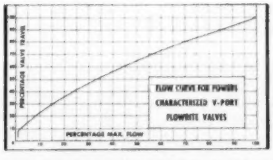
Gives Better Control with Less Maintenance

SPECIAL FLOW CHARACTERISTICS—High lift V-Port plug provides proportional flow throughout entire lift of stem as shown in chart below.

WIDE VARIETY OF SIZES—½" valve available with plugs to give 15%, 30%, 60% or 100% of maximum capacity. Easily interchangeable without removing valve from line.

SUPERIOR DESIGN of stainless steel plug and seat reduces wire drawing, insures longer life and tight shut-off. V-Ports do the throttling, protecting separate shut-off seat. Write for circular (a70).



THE POWERS REGULATOR CO., Skokie, Ill.

FRUEHAUF REFRIGERATOR VANS
Help Margarine Processor Build Business!

Osceola Foods, Inc., entered the margarine manufacturing business in 1949, and uses Fruehauf Stainless Steel Refrigerator Vans exclusively in hauling its product to all distribution points from the plant in Osceola, Arkansas.

"OUR ABILITY to deliver margarine *in perfect condition* at all times — even during the hot summer months — is due to the *positive, dependable* temperature control of our Fruehauf Refrigerator Vans," states R. A. Atkinson, Plant Superintendent of Osceola Foods.

"Yet operating costs per mile on our Stainless Steel Fruehaufs have been far below our expectations. For instance, after 8 months and 64,000 miles of operation, the tires on our Fruehauf equipped with Gravity Tandem Suspension show no noticeable wear!

"Fruehauf, with its dependable, money-saving equipment, has done *more* than its share to bring about the fast growth of our business and profits."

Fruehauf's full line of Refrigerator Vans, either single or tandem axle, includes the Aerovan, Stainless Steel, and Corrugated Aluminum models.

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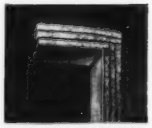
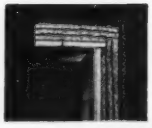
For complete information on "hauling savings with Fruehauf," write for the free, illustrated catalog showing all Fruehauf models.





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35° or above
For fresh fruit, vegetables, eggs, milk, meat

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As low as —10°
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All Fruehauf Insulation Is Lightweight Ultralite Glass Fiber!
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Just Off the Press

New Catalogs and Bulletins from manufacturers of equipment and supplies —For Free Copies, Use Reader Service—

Food Plant Equipment

Bottling Machine

New leaflet concerns automatic bottle filler of rotary vacuum type. Unit has 16 filling valves, 8 ft. table-top chain conveyor, variable speed drive, and adjustments to handle 1 oz. to 1 gal.—*Lipac, Inc., 475 Fifth Ave., New York 17.*

Circle L233A on Reader Service Card

Glass-Lined Steel

Directed to dairy, food, and beverage industries, *The Glass Lining*, Vol. 18, No. 3, describes advantages of combining glass and steel in construction and equipment. 16 pages.—*The Pfaudler Co., Rochester 3, N. Y.*

Circle L233B on Reader Service Card

Gears, Couplings

Illustrated bulletin shows line of gears and couplings and gives types and size ranges. Other facts pertain to speed reducers and Limitorque valve controls. 4 pages.—*Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34.*

Circle L233C on Reader Service Card

Package Filling Units

Accurate weight—from 2g. to 5 lb.—is feature of new package filling machines, states maker in 4-page bulletin. Units are stated to deliver 9-72 fpm., depending on container, material, and operator dexterity. Wide range of food is termed applicable.—*Paul L. Karstrom Co., 1822 W. 74th St., Chicago 36.*

Circle L233D on Reader Service Card

Dust, Fume Collectors

Catalog 72-B describes dust and fume collecting units. Replete with diagrams and essential data, it lists advantages, such as easy installation, simple inspection, long cloth life, and curbing of leakage. Section on auxiliary equipment is added feature. 36 pages.—*American Wheelabrator & Equipment Corp., Mishawaka, Ind.*

Circle L233E on Reader Service Card

Centrifugal Blower

Bulletin 19B6104A describes construction features of multi-stage centrifugal blowers for equivalent air pressures above 6.5 psig. and inlet volumes above 1,500 cfm. Photos show blowers with casing tops removed, along with examples of installation. 6 pages.—*Allis-Chalmers Mfg. Co., 1113 S. 70th St., Milwaukee.*

Circle L233F on Reader Service Card

Emergency Power Units

Standby emergency power is discussed in Bulletin 35. Given are requirements, types of service, details on controls for automatic start-stop operation, and description of various units. 20 pages.—*Electric Machinery Mfg. Co., 1331 Tyler St., Minneapolis.*

Circle L233G on Reader Service Card

Belt Feeder

Bulletin 35-F5B describes belt feeder reported to make possible continuous weighing and feeding of dry materials at capacities of 100 to 100,000 lb. per hr. Also discussed are operation of vibratory feeder, weighbelt, scale beam, and other feeder parts. 4 pages.—*Omega Machine Co., 345 Harris Ave., Providence 1, R. I.*

Circle L233H on Reader Service Card

Heating, Ventilating Catalog

Complete line of air conditioning, heating, ventilating, and heat transfer equipment is covered in Catalog PB-290. Supplementing 40 specialized bulletins, it is well-documented with specifications and illustrations. 36 pages.—*The Trane Co., La Crosse, Wis.*

Circle L233I on Reader Service Card

Air-Conditioning Cabinets

Horizontal and vertical air conditioning cabinets are presented in Bulletin 3703A. In sizes from 875 to 22,000 cu. ft. conditioned air per minute, models may be used for summer cooling, winter heating, humidifying or dehumidifying, as well as air cleaning. 40 pages.—*Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.*

Circle L233J on Reader Service Card

Heat-Sealing Units

Equipment for heat-sealing coated or laminated materials is discussed in 4-page folder. Dials or gages show heat degree, pressure, and dwell-time. Special features and applications are given. —*Packaging Industries, 50 Church St., Montclair, N. J.*

Circle L233K on Reader Service Card

Oil Burners

Complete line of oil burners for heat generation and utilization are described in new catalog. Il-

BEST FOR THE LONG HAUL
CORRUGATED CONTAINERS ENGINEERED
TO GOVERNMENT SPECIFICATIONS
FOR EXPORT AND DOMESTIC SHIPMENTS

Stone-wall

Check with a Stone Container Engineer for complete details, samples and prices.

If your export shipping requirements call for corrugated containers made of V-Board or W-Board . . you will want complete data on Stone's Weatherproof Corrugated Containers —built to meet unqualifiedly all government specifications. For domestic shipping, you'll want Stone's LLLB Containers built to conform to government specifications!

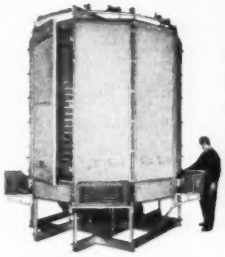
Since 1926 we have served industry's needs for corrugated cartons.

STONE CONTAINER CORPORATION

GENERAL OFFICES: 4200 W. 42nd Place, Chicago 34, Ill.
SALES OFFICES AND PLANTS: Chicago, Ill.; Mansfield, Ohio; Philadelphia, Pa.
MILLS: Franklin, Ohio; Coshocton, Ohio; Mobile, Ala. (Affil.)

ONE-PIECE SPUN TRAYS

for the PACKAGED



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CONTINUOUS, VERTICAL, TRANSFER TYPE

for SENSITIVE FOOD PRODUCTS

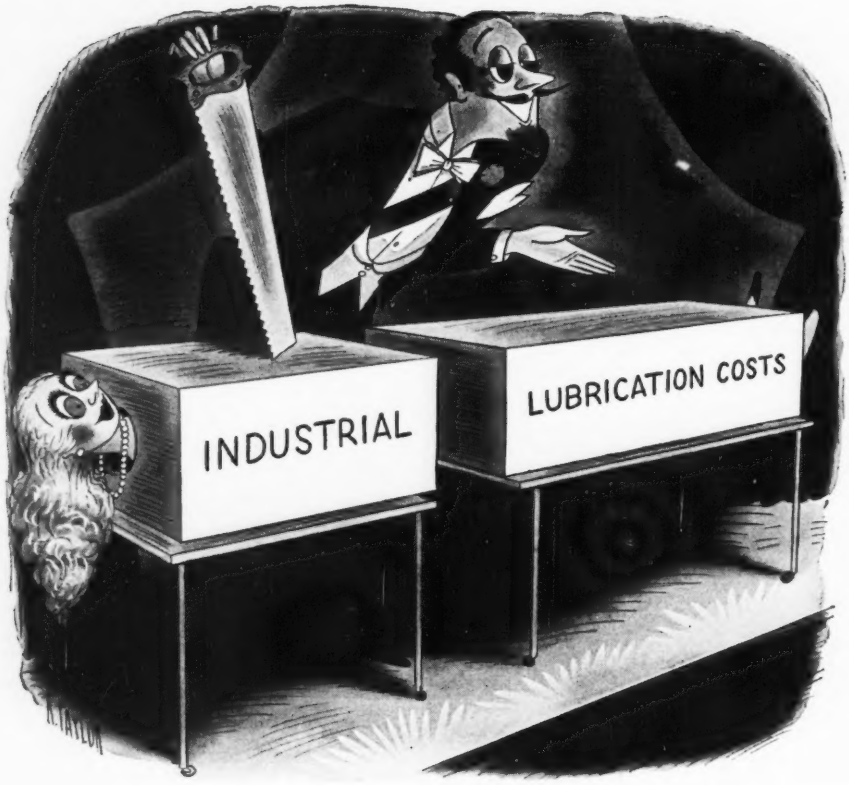
High efficiency, low maintenance, easily accessible for quick cleaning.

Write for Bulletin!

also suitable for COOLING and TOASTING

TURBO DRYER

WYSSMONT COMPANY
DRYING ENGINEERS
31-04K Northern Blvd., Long Island City 1, N. Y.
Representatives in Principal Cities



Nice trick, and you can do it... with Pure Oil Industrial Lubricants

Many of the top-quality oils and greases in Pure Oil's complete line of industrial lubricants have been designed to do several *different* jobs, instead of one specific job.

And to do each job *equally well.*

This enables you to do *all* your lubricating with *fewer* lubricants. In other words, you can

simplify and save... with Pure Oil Industrial Lubricants

If you are interested in something that can definitely cut your costs (and who isn't, in times like these?), write: The Pure Oil Company, Industrial Sales, 35 E. Wacker Dr., Chicago 1, Illinois.

THE PURE OIL PURE COMPANY, U.S.A.

Be sure with Pure

lustrations depict burners with 5 to 60 gal. capacity. They are designed to use heavy as well as light oil. 8 pages.—*Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12.*

Circle L233L on Reader Service Card

Scales for Rice

Automatic scales designed for the rice industry are shown in Bulletin 0251. Information on speed, capacity, and accessories is given. Special section treats of bagging spout, oscillation packer, stop counter, and bag-sewing conveyor. 6 pages.—*Richardson Scale Co., Clifton, N. J.*

Circle L235A on Reader Service Card

Reciprocating Pumps

Line of high pressure pumps is described in Bulletin P-151. Of 2- and 4-cyclinder, pumps come in eight sizes with 3½ to 60 gpm. rating, and pressures from 350 to 1,000 psi. 8 pages.—*The Rovalton Co., Inc., Gasport, N. Y.*

Circle L235B on Reader Service Card

Control Equipment

Visible-Flow Indicators

Leaflet describes indicators with flow visibility. Features emphasized are positive seal, light weight, and tamperproof construction. Given are specifications, pressure ratings, and dimensions. —*Trinity Equipment Corp., 472 Westfield Ave., E., Roselle Park, N. J.*

Circle L235C on Reader Service Card

Panelboards

Bulletin 500 gives details on panelboards and applications. Types for lighting circuits or for power distribution are listed with amperage details and construction features. Also, list prices are given. 24 pages.—*Continental Electric Equipment Co., Box 1055, Cincinnati 1.*

Circle L235D on Reader Service Card

Metal Detector

Protecting device indicates metallic particles, either magnetic or non-magnetic, in open or packaged materials. Designed for use on most materials-handling equipment. Metal presence actuates signal, marking device, or ejector, states Catalog E-41. 4 pages.—*Radio Corp. of America, Engineering Products Dept., Camden, N. J.*

Circle L235E on Reader Service Card

Combustion Controllers

Details on combustion control equipment and technics for oil- and gas-fired boilers are given in Bulletin 1023. Lucid facts and figures on 300 installations include components ranging from 6,000 to 1,000,000 lb. per hr. 24 pages.—*Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10.*

Circle L235F on Reader Service Card

Microscope Movie

Electron microscopy is subject of new 16 mm. sound film. Applicability of specific electron microscope is given. Film runs 30 min.—*C. J. Woods, Research & Control Instruments Div., North American Philips Co., Inc., 750 S. Fulton Ave., Mount Vernon, N. Y.*

Circle L235G on Reader Service Card

Materials Handling

Hand Lift Trucks

Bulletin 5110 gives information on single-stroke hand lift trucks. Loads to 4,000 lb. may be lifted with one stroke, maker states, in certain models. 8 pages.—*Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9.*

Circle L235H on Reader Service Card

Overhead Conveyors

Well illustrated Catalog 2330 shows how utilization of overhead conveyors can increase useable floor space. Maker states conveyors are adaptable for variety of needs in food and allied industries. 28 pages.—*Link-Belt Co., 301 W. Pershing Rd., Chicago 9.*

Circle L235I on Reader Service Card

Clamp Trucks

Complete line of clamp trucks for moving boxes, crates, baskets, and lugs, is shown in recent bulletin. Foot pedal operates clamp arms that grip containers. Types for handling empty boxes are described. 8 pages.—*Food Machinery & Chemical Corp., Packing Equipment Div., Riverside, Calif.*

Circle L235J on Reader Service Card

Crane Trucks

Locomotive-type crane trucks are discussed in Bulletin 1613. Two models are offered, one with rated capacity of 6,000 lb., other 10,000 lb. Cutaway photos show component parts. Engineering specifications and drawings are included.—*Baker Industrial Truck Div., Baker-Raulang Co., Cleveland 2.*

Circle L235K on Reader Service Card

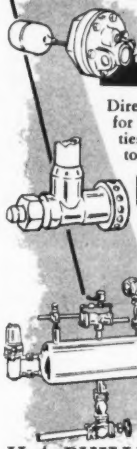
Portable Conveyors

Outlined in recent bulletin are conveyors and stands that have added feature of portability.

"A **Simple** CONTROL IS THE **Best** CONTROL"

. . . for efficiency's sake . . .

SPECIFY PHILLIPS FLOAT CONTROLS



FLOAT CONTROLS

Direct Feed and Remote Feed types adaptable for high side or low side applications. Capacities range from 1 to 1000 tons for "Freon"; 1 to 2000 tons for ammonia.

REFRIGERANT INJECTOR

Phillips refrigerant injection provides high efficiency evaporation with "Freon", especially in high capacity, flooded operation.

LIQUID RETURN SYSTEM

The Phillips system protects ammonia compressors against liquid slop-over and gives dry suction line gas for top compressor efficiency.

For dependable, efficient operation of your present or new equipment, choose Phillips—engineering advice willingly given. Write for catalog.

H. A. PHILLIPS & CO. DESIGNERS AND ENGINEERS
REFRIGERATION CONTROLS SYSTEMS
3255 W. CARROLL AVENUE • CHICAGO 24, ILLINOIS
REPRESENTATIVES: THE C & S EQUIPMENT CO.
2103 S. San Pedro Street, Los Angeles, California
MASON EMANUELS CO. • 90 Dearborn Street, Seattle 4, Washington

AMERICAN SPICE TRADE ASSOCIATION
82 WALL STREET
NEW YORK 5, N. Y.

Natural spices help prevent the deterioration of fats in food.

Research conducted at the Hormel Institute demonstrated the antioxidant value of natural spices. Oxygen was passed through steam-treated lard in which ground spices were mixed, and the deterioration was compared with unspiced samples. Results: "Virtually all samples tested showed at least some antioxidant activity; in a few cases, the antioxidant effects were very pronounced."

Pat. 2188741 2526290

Exclusive scroll effect design, built in assures you of efficient performance against normally encountered static pressures.

Air-Vans are weatherproof and self contained — shipped to your job site completely assembled, ready to install. You get all the economies of direct connection in a superb low silhouette unit. Air Vans have been built to a standard of rugged dependability. Compare Air-Van material specifications and you'll see the difference.

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Performance Ratings CERTIFIED by an independent laboratory. Cap: 150-11,000 CFM: Static Pressures to 1¾".

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Omaha, Nebr. Owatonna, Minn.

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Get literature, catalogs or detailed information that you need from manufacturers of equipment, materials, supplies, ingredients.

for your convenience

USE READER SERVICE

Maker states units are corrosion-resistant, integrally lubricated, and of high endurance. 4 pages.—*Carter Industries, 1704 Dreman St., Cincinnati 23.*

Circle L235L on Reader Service Card

Ancnt Conveyors

Profusely illustrated brochure shows complete line of conveyors. Included are cleated belt boosters, inclined, horizontal, gravity, and unscrambling conveyors. There is unit, states maker, for each type materials handling problem. 150 pages.—*Island Equipment Corp., 27-01 Bridge Plaza North, Long Island City 1, N. Y.*

Circle R236A on Reader Service Card

Plant Supplies

Water Filtration

Bulletin B-12W just released concerns use of diatomaceous filter aids in filtering water for reclamation and re-cycling in industrial processing, for prevention of pollution in waste disposal, and for purification of domestic and industrial potable supply. 23 pages.—*Great Lakes Carbon Corp., 18 E. 48th St., New York 17.*

Circle R236B on Reader Service Card

Flavoring Materials

True flavors are imparted to foods by use of special products, states manufacturer in recently issued bulletin. Flavors for confections, bakery products, bottlers' products, ice cream, etc., are available. 16 pages.—*Synfleur Scientific Laboratories, Inc., Monticello, N. Y.*

Circle R236C on Reader Service Card

Milkhouse Electricity

Numerous electrical units for employment in milkhouses are discussed in Bulletin B-4320-B. How to select size and shape of apparatus for milk cooling, plus heating, ventilating, and lighting equipment is discussed, and there is also information on germicidal lamps, wiring, and circuit protection. 12 pages.—*Westinghouse Electric Corp., Box 2099, Pittsburgh 30.*

Circle R236D on Reader Service Card

Brick Floors

Corrosion-resistant flooring in the form of bricks is detailed in Bulletin AB17. Manufacturer asserts flooring will stand up against acids, alkalis, foods, oils, water, steam, and also heavy traffic. 16 pages.—*Mr. Stanley Powers, The U. S. Stoneware Co., Akron 9.*

Circle R236E on Reader Service Card

Cannery Lighting

Analysis of most efficient lighting for canneries is offered in a special reprint, *Lighting for Canneries.* Also, there is included 4-page leaflet covering a wide range of lighting equipment. (Note: A charge of 50c. is made for this literature.)—*Illuminating Engineering Society, 1860 Broadway, New York City 23.*

Miscellaneous

X-Ray Diffraction

Booklet *What is X-ray Diffraction?* considers subject as applied to dairy products, vegetable oils, and foods in general. Aim is to assure uniformity and identify unknown mixture constituents and impurities. 8 pages.—*Research & Control Instruments Div., N. American Philips Co., Inc., 750 S. Fulton Ave., Mount Vernon, N. Y.*

Circle R236F on Reader Service Card

Package-Material Booklet

How new materials can be utilized in packaging is outlined in brochure *How Aluminum Can Save Tin.* Packaging of 22 dry-food products is discussed, with accompanying tables on materials and costs. 26 pages.—*Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.*

Circle R236G on Reader Service Card

On Labeling

Illustrated manual discusses round-container labeling applications. Sections deal with machines suitable for labeling glass jars, bottles, tin cans, and fiber-bodied cans. 8 pages.—*Paisley Products, Inc., 1770 Canalport Ave., Chicago 16.*

Circle R236H on Reader Service Card

Uniforms

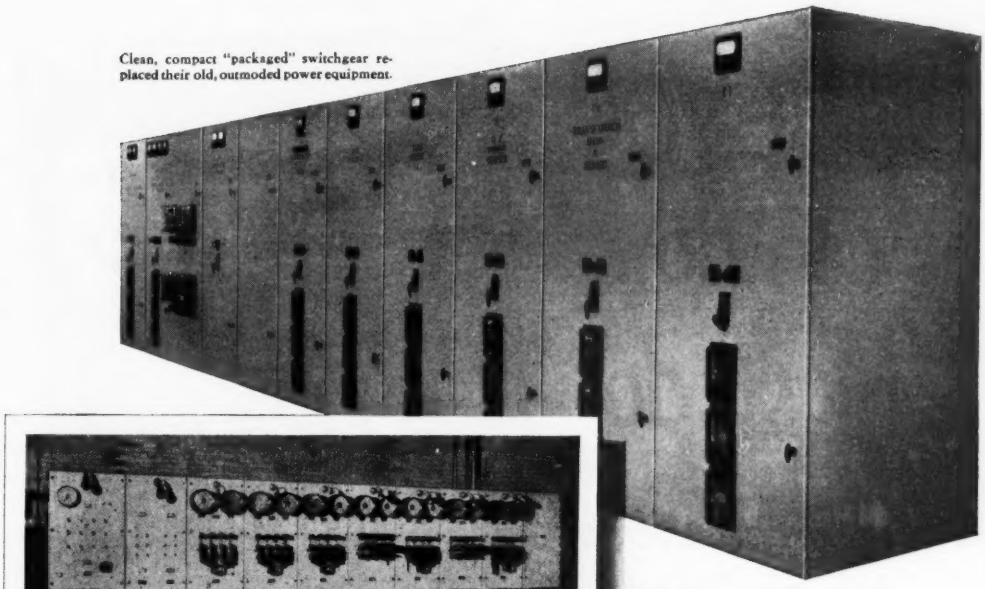
New catalog offers variety of 200 washable uniforms. Fashion features are said to be eye-pleasing, while emphasis is on employee comfort and wear.—*Angelica Uniform Co., 1419 Olive St., St. Louis 3.*

Circle R236I on Reader Service Card

Free Literature—Quick Way

Any of these very-latest catalogs, bulletins, or folders will be sped to you gratis. Just note here the specific literature you want, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard inside the back cover. Then sign at the bottom and mail. No postage is required.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.



Clean, compact "packaged" switchgear replaced their old, outmoded power equipment.

How a modernized Power Distribution System saves money for this meat packer

Recently, a middle western meat-packing plant discovered their outmoded power system was wasting money. The old system was of the wrong type, was unable to take care of new loads being added to the system, was undependable, and was costing money generally. So Westinghouse worked with them and their consulting engineers in planning a new system.

Old Outmoded Equipment Replaced

One of the first moves was to replace the dangerous old open-knife switch equipment with modern power centers like that shown above. These combined in one safe, compact unit both the transformers and the switchgear for a whole section of the plant.

Greater Safety and Flexibility

Besides being highly dependable, there are no exposed live parts to create a safety hazard. Their packaged design permits additional units to be easily added as the demands on the system increase. The draw-out breakers permit easy maintenance.

Westinghouse Can Help You, Too

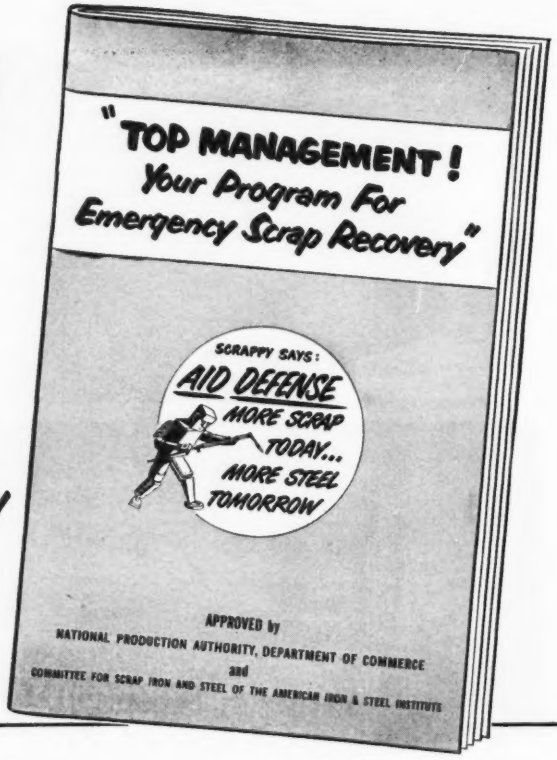
If your power system needs modernizing, or if you plan to build or expand, use Westinghouse know-how in the Food Industry to help you plan the power system or drives best suited to your needs. J-94921

YOU CAN BE SURE... IF IT'S Westinghouse

EQUIPMENT FOR FOOD PROCESSING

What YOU can do... Must do

to ease the critical iron and steel scrap problem


"TOP MANAGEMENT! Your Program For Emergency Scrap Recovery"
SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW
APPROVED by
NATIONAL PRODUCTION AUTHORITY, DEPARTMENT OF COMMERCE
and
COMMITTEE FOR SCRAP IRON AND STEEL OF THE AMERICAN IRON & STEEL INSTITUTE

It's a problem calling for the assistance of every thoughtful business man—now.

Unless the steel mills get more scrap . . . furnaces may have to be shut down.

Shut down—at a time when our armed forces need more and more equipment . . . when civilian demands for steel are greater than ever . . . when our economy is fighting desperately against inflation!

You Can Help. Yes . . . regardless of the business you're in . . . you're in the scrap business, too.

If you're in the steel-fabricating business, you have extra *dormant* scrap to be added to your *production* scrap.

If you're in any other business, you surely have idle metal that will do you—and America—more good being fed into furnaces than cluttering up your premises.

Write for Suggestions. The booklet shown here tells how to set up a Scrap Salvage Program with least amount of effort and minimum interference with your regular operation. It tells where to look for scrap, what to do with it when you get it.

You are urged to send for the booklet now. Use the coupon.

FACTS ABOUT SCRAP SALVAGE

Steel production	1950 — 97,800,000 net tons
Estimated capacity	1952 — 119,500,000 net tons
Purchased scrap used*	1950 — 29,500,000 gross tons
Estimated purchased scrap requirement*	1952 — 36,200,000 gross tons

*All consumers

Where will the extra tonnage come from? Mostly from your *dormant* metal—obsolete machines and structures, tools, jigs, fixtures, gears, wheels, chains, track.

NON FERROUS METAL NEEDED, TOO!

A PUBLIC SERVICE PROJECT — THE ADVERTISING COUNCIL

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Advertising Council
25 W. 45th St.
New York 19, N. Y.

Please send me a copy of the free booklet: "Top Management: Your Program for Emergency Scrap Recovery"

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CITY..... ZONE..... STATE.....

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Consulting Food and Chemical Engineers
Specializing in:
Designing, Estimating and Engineering of New and Modernizing of Old Food and Chemical Plants and Processes.
Internationally Known.
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PLANT SANITATION—MANDATORY LABELING.
LABORATORY SERVICES: Filth in foods, food analysis, bacteriological tests.
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FOOD DEVELOPMENT LABORATORY
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Service to the Baking and Potato Chip Industries
Baking, Frying, Chemical, Physical
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Now, more than ever before,
the food industry should take advantage of the opportunity to use the broad experience and knowledge of the consultant and profit by such use.

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Food Consultants and Analysts since 1920
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Specialists in Canned and Glassed Foods Laboratory Services
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An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

Individual Spaces with border rules for prominent display of advertisements.

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WANTED by responsible and aggressive Bakery Supply House in fast growing section of U. S. Must have experience in Food and Machinery lines and in directing sales organization. Excellent opportunity for capable man seeking permanent connection with future. Give all information, Family status, experience, etc.

P-3778, Food Engineering
520 No. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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FOOD CHEMIST Wanted. Experience necessary. Old established firm, equipped laboratory, Chicago suburb. Development new items, improvement old. Generous salary commensurate with ability. Progressive management. Please give resume of personal data, education, experience, and salary requirements with your reply. P-4146, Food Engineering.

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SALARIED PERSONNEL, $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

YOUNG CHEMICAL Engineer B.Ch.E. with three years experience in Food Industry, Product Analyses, Quality Control, Supervision Laboratory Supervisor. Desires Quality Control, Research or Development. PW-4126, Food Engineering.

(Continued on page 240)

PREPARED MIX TECHNOLOGIST

To work in Pilot Plant Development and Production Work in the prepared mix field. Prefer chemical engineering background. Give complete summary of education and experience. Salary commensurate with ability and experience.

Write HBF, Personnel Department

PILLSBURY MILLS, INC.
MINNEAPOLIS 2 — MINNESOTA

Chemical Engineer Wanted

Technical service on new continuous mixing process, food and chemical industries. Excellent opportunity for young man — two years experience process equipment. Ability to meet top-level customer personnel—some travel required.

Mr. John A. Abbott
American Machine & Foundry Co.
485 5th Avenue, New York, N. Y.

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For the Food Processor

CARROT OIL makes foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A. Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

WHERE TO STORE FROZEN FOODS

QUAKER CITY COLD STORAGE CO., Inc.
PHILADELPHIA, PA.
3 WAREHOUSE LOCATIONS
Proper Temperature for Frozen Foods

SEARCHLIGHT SECTION

(Continued from preceding page)

POSITIONS WANTED

CHEMIST, RESEARCH & Production, with wide experience in many phases of manufacture and development of chocolate, confectionery, macaroni products, many desserts, and other food products, desires position of responsibility to fully use his ability. PW-4134, Food Engineering.

FOOD TECHNOLOGIST: Experienced production supervision, product and processing research, wants position in production, or related. 15 years experience canned and frozen foods; ice cream, fountain, and bakery supplies. Technical and engineering background, M.S. plus. Age 40, married, family. PW-4052, Food Engineering.

FOOD TECHNOLOGIST. Ph.D. Age 35, Organic, biochemical, & engineering background. Presently employed as Assistant Laboratory Director of consulting firm in food & beverage field. Desire responsible supervisory position in research or process development on food products in N. Y.-N. J. area. Present salary $8,000/yr. PW-4153, Food Engineering.

PRODUCTION MAN, all phases of production, supervisory and some administrative experience. Most experience has been in biscuit (icing) and candy manufacture. My present position is superintendent candy manf. PW-3973, Food Engineering, 520 N. Michigan, Chicago, Ill.

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SALESMAN COVERING Missouri and Kansas seeks product of merit to represent that area. P.O. Box 825, Minneapolis 1, Minn.

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a. Mathematics and Chemistry of Food Technology
b. Food Analysis
c. Nutrition
d. Canning
e. Freezing
f. Preserving
g. Inspection and Grading according to USDA standards
h. Mold Counting and Insect Examination

RESTAURANT MANAGEMENT
GENERAL STUDY OF COOKING
PREPARATION OF SALADS
PIE AND PASTRY MAKING
CAKE DECORATING
STUDY OF MEATS

MEN OR WOMEN
VETERANS OR NON-VETERANS
DAY AND NIGHT CLASSES

Highly qualified instructors with practical experience as well as European and American degrees in their respective fields.

ATTENTION EMPLOYERS

If you need qualified personnel, such as: Food Technologists, Laboratory Technicians, Mold Counters, Foremen, Forelaides, Graders and other trained personnel for Quality Control Work please contact the Employment Office of the school.

MIAMI SCHOOL FOR FOOD PROCESSING SPECIALISTS

Box 383 CORAL GABLES 34, FLORIDA
Telephone: 83-1301

NUTRITIONIST—$10,000

FEED MAN, with AG. Major. Prefer West Coast man with exp. calling on Feed M'Frs. Good public relations caliber. Exc. oppor.

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Personnel for the Food Industry

Busy food executives find that *at no cost to themselves* I can save them time and money in searching for that particular person they must have for their staff.

JOHN McCLOUD
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TO EXPEDITE PRODUCTION

Food Processing Equipment including Aluminum and S/S Kettles, Mixers, Vacuum Pins, Dehydration equipment, Grinders, Elevators, Stills, Colloid Mills, Conveyors, Filters, Packaging Units, Wrapping Machines. Will consider a set up plant now operating or shut down. When offering give full particulars.

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We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets or stock of one of more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.

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WANTED
Single Spindle CAPPING MACHINE automatic

W-3983, Food Engineering
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WANTED
AUTOMATIC SCREW CAPPING MACHINE

Single spindle. Quote make, type, size, price to

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DEALERS ATTENTION!

We have in stock for immediate delivery 11 stainless steel powder filters including Klein and Niagara, with separate closed feeders. Prices reasonable and will be glad to cooperate with you.

Send for Complete List on these Bargain Filters.

Also, have you our List #2152 showing the more than 400 tanks that we have in our stock, most of which are glass-lined, ranging in capacities from 3000-15,000 gallons, both horizontal and vertical.

Write

FS-4022, Food Engineering
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FOR SALE

100 qt. 6 speed Read Vertical Mixer
80 qt. 4 speed Hobart Vertical Mixer
No. 76 Enterprise Food Grinder, belt drive
Burns Peanut Roasters and Blanchers
No. 6 Royal Roaster, 75 lb. capacity
125, 200 and 250 lb. Nut Fryers
250 gallon Copper Steam Jacketed Kettle

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FOR SALE
JAR CAPS

Approx. 280,000 53 M.M. Anchorvac N style. Plain enamel inside, Gold outside. BRAND NEW.
Price $7.50 per M f.o.b. Allentown, Pa.

ALLEN PRODUCTS CO.
ALLENTOWN, PA.

FOR SALE

6—Pocket M & S #1 filler—will handle cans or jars up to 309—now set up for 211-304 or 8Z tall —new change parts for 202-309—bronze contact parts—can chute

6—Pocket M & S #2 filler—with new S.S. agit hopper—bronze valves and pockets—new S.S. main shaft—new screw feed for 16-oz. economy jars—will handle cans or jars up to #2—set up for #2 cans or 1-lb. economy jars—new change parts for 211-304 or 8Z tall cans

2—Instant & continuous Fondant Machines. Large stainless steel Syrup Hoppers—7½ HP. Motors.

Both machines have been completely rebuilt with new piston rings, new studs, new splash proof motors, direct drive, variable speed and new micromatic weight adjustments.

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IN CHICAGO IT'S CHesapeake 3-5300

1—J. H. Day Model D-8 800# Cap. Ribbon Mixer.
1—J. H. Day Sifter & Mixer Comb.—100# Cap.
1—Gardner-Robinson Ribbon Mixer, App. 1000# Cap.
2—6500# Ribbon Mixers—11' Long—12" Wide—48" Deep Jacketed for 100# Working Pressure
Portable Agitators—1/3 Hp. ¾ Hp and ¾ Hp. S/S
1—Peerless Dough Mixer—Dble. Arm—1½ Barrel Cap. S.S. Steam Jacketed Kettles & Sgle. Shell Tanks.

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PHONE: CHesapeake 3-5300
FOOD and CHEMICAL PROCESSING EQUIPMENT

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Filler—Mojonnier Model #90—Stainless—
14 head $5000.00
Filler & Cartoner—Fred Goat—Satchel Bag 1100.00
Scale—Winter Coleman—Bulk type..... 55.00
Scale—Automatic Weighing Machine Co... 55 00
Can Be Inspected in Philadelphia.
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Two (2) Langsenkamp dump scalders, each with two (2) stainless steel perforated compartments, dumping mechanism, drain and steam connections. Good condition. Purchased 1941 and 1942.

Two (2) Bostitch stitchers, Model #22, with ½-inch crown parts for #25 wire. Good condition. Purchased 1938 and 1941.

One (1) Filler Machine Company filler, Model 123? 4-spout, with stainless steel or monel product contact parts and hopper. Good condition. Purchased 1942.

One (1) Pneumatic Scale package wrapper, Serial #4900. Speed 30 per minute. Fair condition.

One (1) Dust collector having Sturtevant #25 exhauster with motor and Pangborn type CD-1, #3 separator. Very good condition. Purchased 1947.

One (1) Pneumatic Scale gross weight, two-scale weigher, Serial #4339. Speed 30 per minute. Fair condition. Purchased 1930.

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IMMEDIATE DELIVERY

125-Gallon Stainless Steel Girdler Turbine Type Premixing Tank, Platform and 7-½ H.P. Main Drive 220 Volt 60 Cycle 3 Phase Motor.

Practically new. Less than a year old. Used on a limited number of test runs only.

Write to: T. R. STEVENS
American Machine & Foundry Co.
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1—500 Gallon storage tank for syrup. Heavy steel, open top with 3½" gate valve discharge.
1—Reed 120 Qt. Vertical mixer, with bowls and attachments completely overhauled A-1 condition.
1—Century 120 Qt. vertical mixer, dough hook, paddle, whip; 120 and 40 Qt. Bowls reconditioned, new gears.
1—Gas Fired agitating candy cooker with copper kettles.
1—Steam jacketed J. H. Day 1 bbl Horizontal mixer with paddle agitators with 2 H.P. motor. 3 phase.
1—Steam jacketed candy cooker with belt driven agitator 50 gallon copper kettle.
1—Triangle Class S B Small Filling machine with scale and hopper.
1—50 Gallon Steam Jacket Tilting copper kettle.

SCHE-ROSE CORP.
2500 S. Ervay St. Dallas 1, Texas

NOW-AN INCREASED AND IMPROVED SERVICE

LARGER STOCKS • MODERN EQUIPMENT • IMMEDIATE DELIVERIES

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3—6'x50' Louisville Rotary Steam Tube Dryers.
1—4'x8' Flaker or Cooling Roll.
6—Atmos. Double Drum Dryers—1—B & O 28"x60"; 4—Buflovak 32"x80" & 32"x72"; 1—Amer. 42"x120".

MIXERS, Dry Powder

2—Kilby jack. ribbon, 600 cu. ft. stuffing boxes.
2—Davis 4000# ribbon; 1—Howes 3000# dbl. ribbon.
1—Day Size F 1850#; 1—Munson Rotary 1000# batch; 2—Day Size D8 800#; 2—Broughton 700# & 1500#; 2—Jabez Burns 500#, ribbon; 1—Day 200#, with sifter.

MIXERS, Miscellaneous

4—AMF Glen Mixers, 340, 160, 120 qt., S/S bowls & beaters.
4—B.P. 3000 gal. jacketed Mixers, size 30, type X-BS; 1—B.P. 1200 gal. unjack. Size 24, type X-BS.
1—BP 625 gal. Size 21 type X-BB; 3—350 gal.; 1—100 gal. Vacuum size 15 type VII-BB; 1—100 gal. size 15 type VI-BB; all jacketed.
1—Day size 30 Imperial unjacketed 75 gal. S/S lined S/S blades.
2—Reed 40 & 50 gal. double arm Mixers.

VACUUM PANS

1—Burkhard Jacketed 40 gal. Copper Vacuum Pan, 26" dia. x 26" deep.
1—All Copper 125 gal. Vacuum Pan, 30" dia. x 30" deep.
1—300 gal. Jacketed Copper Vacuum Pan, coils, 44" dia. x 36" deep.
4—Mojonnier S/S Vacuum Pans, 3', 4', 5' and 6'.

EVAPORATORS

1—Zaremba Single Effect Evaporator, 54' dia. x 16', Black Steel body, copper tubes, 556 sq. ft., with Elliot Barometric Condenser.
1—Swenson-Walker Triple Effect Evaporator, 1320 sq. ft. total. With copper tubes, steam pumps, condenser and piping.

PACKAGING MACHINES

2—Pneumatic Scale Packaging Lines, incl. Carton Feeder, former liner, Weigher, Sealer, etc.
3—Transwrap Machines, Model A and Model B.
1—Standard Knap #429 Self-Adjusting Gluer-Sealer & Comp. Unit.

COLLOID MILLS

1—Charlotte ND-20 Horizontal Colloid Mill, Type #316 Stainless, 20 HP.
1—U. S. Horiz. Colloid Mill, 100-600 GPH, with 2—10 HP motors.
1—Eppenbach Vertical Size B Sanitary type S/S Colloid Mill, 3—30 GPH, Explosion proof motor.
1—U. S., Jr. Model Colloid Mill, 50-60 GPH, with 2—3 HP motors.
2—Premier Colloid Mills, Paste type, V-3-2109, Stellited Rotors, 7½ HP.

SCREENS & SIFTERS

1—"Selectro" 3'x6' Triple Deck, totally enclosed Vibrating Screen.
2—"Selectro" Single Deck Vibrating Screens 3'x8' and 1½'x5'.

LABELLING MACHINES

4—World & Ermold Semi Automatic; 2—World Rotary Automatic; 3—Burt Adjustable Wrap-Around; 6—N. J. Pony Labelrites.

FILTERS

7—Filter Presses from 7"x7" to 42"x42" Cast Iron, Plate & Frame, Recessed, Open and Closed deliveries.
1—30"x30" Aluminum Filter Press, 45 Chambers.
1—30"x30" Shriver, jack. 30 chambers.
2—Sparkler Filters, 18D4 S/S & 18D12 Steel.
8—Oliver Vacuum Filters, incl. 8'x12', 11'6"x 14', 11'6"x18'.

KETTLES

28—Aluminum Jacketed Kettles, from 50-500 gal., some agitated.
13—S/S Jacketed Kettles, from 30 to 300 gals., some agitated.
18—Copper Jacketed Kettles, from 25-600 gals.
8—Dopp C.I. jacketed 100, 150, 350 & 600 gal.; 3—150 gal. double motion agitated & jacketed.

TANKS

3—York 500 gal. Refrigeration Tanks, S/S lined, agitated.
5—9800 gal. Horiz. S/S Storage Tanks, jack.
2—100 gal. S/S lined Vertical Tanks.
45—Aluminum Rectangular Storage Tanks, 600 gal., 650 gal. & 200 gal. capacities.
40—Misc. Steel Tanks, 500 gal.-15,000 gals.

MISCELLANEOUS

1—Buflovak 6' Vacuum Crystallizer.
1—5'x18' Mech. Jack. Cooker or Dryer.
2—42" Amer. Tool & Machine Co. S/S Centrifugals, 40 HP motor.
1—Tolhurst 40" Monel Centrifugal.
86—Portable Agitators, all sizes & speeds.
3—Mikro Pulverizers, 2SI, 2TH, 4TH.
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3—42"x72" Vertical Retorts, 3-basket.

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8,000 and 10,000# cheese vats, stainless linings, both wood and metal shells.
Damrow type 2 agitators.
#72, 92, 192 **DeLaval Separators,** also Westphalia air-tight.
Presses 20' stainless.
Hoops—Romano, Muenster, Ricotto, Provolone, Salami, Cheddar, Twins, Daisy.
5# loaf.
Storage vats—60,000#, 40,000#, also uninsulated enclosed 10,000# stainless ideal for receiving or whey, also half round stainless for receiving or overhead whey storage.
Cheese trucks, skids and skid jacks; motor driven curd mills.
Straightaway Wright can washers 12 and 15 c.p.m.; Cherry and York.
20,000# **super-plates,** complete with holding tubes, flow diversion valves and air controls.
Wright 500-gal. stainless spray type pasteurizing vat, practically new.
Waukesha pumps, 1½" and 2". Sprinkman & Inalloy 20,000# milk filters.

In addition to the above, many other pieces of cheese factory and creamery equipment, all in good condition. We are anxious to sell—no reasonable offer rejected.

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WORTHY OF YOUR ATTENTION

New S.S. Reactors Jktd. & Agtd. from 50 to 5000 gals.
New Ribbon Blenders S.S. or Steel from 12 to 100 cu. ft. Cap.
Also Rebuilt units available.
Send Us Your Specifications.

2 Day Rebuilt Sifters #71, 40" x 84". With Motors
S.S. Or Steel Screens & Rotex 20" x 48"
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Fills from #1 to #10 Containers, complete unit
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Bird Centrifuge, type CH, SS, cylinder.
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Tunnel Truck Dryer, 22 trucks, 600 pans.
Drum Dryer, 5' x 6'.
Double Drum Dryer, 4' x 9'.
Rotary Vacuum Dryer 30" x 8'.
Rotary Dryers, 23" x 15', 4' x 16', 6' x 14'.
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Shriver 36" Filter, 35 chambers.
Oliver 8' x 10' Rotary Filters (3).
Stainless Steel Kettles, 40 gal.
Plaudler, 400 gal. glass-lined Reactor.
Kombinator, Stainless Steel K200.
Mixers—Paddle, Champion, Ajax, Readco-Dough.
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Vacuum Pumps—Nash H7 and Stokes 212C.

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HERE'S the BIGGEST SELECTION of GOOD FOOD-CANNERS' EQUIPMENT AVAILABLE for IMMEDIATE SHIPMENT

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All sizes in Stainless, Copper, Iron, Nickel, Alum.

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Vertical and Horizontal Pressure Vessels up to 15' long.

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Shriver and Sperri Plate & Frame Filter Presses up to 42"; wood or iron Filters by Niagara, Ertel, Alsop, etc.

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M. & S. 10 Pocket S/S Can or Jar Fillers. Mojonnier S/S 14 Head Vacuum Filler. Filler Mach. Co. and Elgin Piston Fillers. Juice Fillers by FMC, Horix, Berlin Chapman. Dry Powder Fillers by Stokes & Smith.

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Wrap around Can and Jar Labellers by Standard Knapp, Burt, Kyler, Nu-Way etc. Spot Labellers semi and fully automatic.

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Urschel Model B in S/S; Sterling EM-1D American Relish Cutters; Smith Silent Cutters; Boutell S/S Slicers; Peelers; Biro Stainless Steel Meat Saw, 1½ HP.

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Standard Knapp Casers or Boxers, Case Printers; Aut. Gluers and Sealers; Pasteurizers, Washers, Colloid Mills, Coolers, Exhausters, Centrifugals, and hundreds of other items. WHAT DO YOU NEED?

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FOR SALE FROM STOCK

6—3000 gal. Horiz. Stainless Steel Tanks, insulated & agitated, sanitary fittings, excellent for transporting, storing or holding milk, food products, wines, etc.

4—Stainless Steel Steam Jacketed Kettles, with double motion agitators, 250 gal., and 150 gal.

70—Stainless Steel and Stainless Clad Steam Jacketed Kettles, 10, 40, 60, 80, 100, 150, 500 gal.

35—Stainless Steel Tanks, 30, 60, 100, 150, 200, 300, 400, 500, 1000, 1400, 2350, 3000, 4200 and 5700 gal.

1—12 gal. Inconel Reaction Kettle, jktd., agit.; with Dowtherm system.

5—Aluminum Tanks, closed, 500, 1350, 1485 gal.

6—Powder Mixers, 50#, 100#, 200#, 400#, 2300#, 2400#.

3—Selectro Stainless Steel Vibrating Screens, two-deck, 2'x7', enclosed.

10—Rotary Pellet Presses, Stokes B-2, D-3 & D-4; Kux model 25.

2—Triangles G-2-C Elec-Tri-Pak Weighers & Fillers.

2—Elgin Auto Twin Piston Fillers.

1—International 12 spout automatic Vacuum Filler, Stainless.

2—Mojonnier #90 Rotary Vacuum Fillers, 14-spout; stainless.

1—U. S. Bottlers, 30-spout Rotary Vacuum Filler, stainless steel.

1—Pneumatic Scale Auto. Duplex Labeler, Front & Back.

1—Kyler model "H" Wrap Around Labeling Machine, to #10 cans.

1—Feinc Rotary Vacuum Filler, string discharge, 4'6" dia. x 6', aluminum.

3—Sweetland Filters, #2, #5, & #12.

1—Alsop T316 Filter SD-12-WR-30.

10—Distillation Columns, aluminum, copper, steel.

1—Fitzpatrick "D" Comminuting Machine, Stainless Steel.

ONE-PIECE WELDED STEEL TANKS
22—15,190 gal. Horiz. Lastiglas lined.
3— 5,725 gal. Horiz. Lastiglas lined.
10— 7,000 gal. Vertical, closed, mammut lined.
6— 7,700 gal. Vertical, closed, mammut lined.
Excellent Condition

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FOR SALE

3—32"x90" Buflovak Double Drum Dryers.
3000 gal. S.S. Truck Tanks, Trailerized.
100 gal. S.S. Clad Jkt. Kettles, 30"x52".
150 gal. S.S. Jkt. Kettle, 42"x34", agit.
100 to 250 gal. S.S. Mix Tanks, water jkt.
300 to 4000 gal. Glass Lined Tanks.
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15 H.P. Lookout Boiler, Coal Fired.
26" Centrifugal Extractors, 3 H.P.
Colloid Mills, 7½ and 15 H.P.
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75 to 1500 gal. Homogenizers or Viscolizers.
Model 148C Stokes High Vacuum Pump, 1½ H.P.
Hobart Grinder, 1½ H.P.
3 ft. to 6 ft. Copper Vacuum Pans.
2" Cherry-Burrell S.S. Pump, 5 H.P.
Milk Pasteurizers, Coolers, Fillers, Washers.

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A BRILL BUY ... IS THE BEST BUY

SEE THESE VALUES!

4—Pfaudler 100 gal. glass-lined, jacketed Stills with glass-lined condenser & receiver.
1—Hersey 3' x 26' s.s. Rotary Dryer.
8—2500 gal. Alum. Storage Tanks.
2—Sharples s.s. Super-D-Hydrators, C20 & C27.
1—#6 Mikro Atomizer, s.s., 20 H.P.
2—Oliver 8' x 10' Monel Rotary Vacuum Filters.
1—Buflovak 32" x 100" double drum Dryer.
1—Albright-Nell 60" x 80" single drum Flaker.
4—Acme & Groen 150, 125 gal. s.s. agitated Kettles.
2—B.P., Day 100 gal. steam jacketed Mixers, Sigma Blades.
1—Fitzpatrick Comminutor Model D, s.s.
1—Link Belt Roto Louvre Dryer 2'7" x 8' Monel.
5—s.s. Revolving Pans 38" diameter.
1—Tolhurst 32" Monel suspended Centrifugal.
1—Fletcher 40" s.s. suspended Centrifugal.
1—#7 Sweetland Filter, 27 leaves.
2—Rotex Sifters 40" x 84", 40" x 104".
4—Shriver 30", 24" P & F Filters.

Send for complete stock list

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1—Sweetland #12 Filter—36 leaves
1—Buflovak 20 shelf 60" x 80" Double Door Vac. Dryer
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1—Stokes 6 shelf 24" x 36" Vac. Dryer
1—Buflovak 6' Jack. Vac. Crystallizer
5—Shriver & Ind. 18", 24", 30" and 42" Wood plate & frame Filter Presses
2—Shriver 30" x 42" C.I. Plate & Frame Filter Presses
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3—Mikro 2 TH and 2 FF Pulverizers
1—Raymond 16" Screen Mill
8—Stainless Kettles 100 to 950 gals. with agitators
8—Stainless Storage Tanks 300 to 5700 gallons

Complete line of Mixers, Screens, Packaging Equipment, etc. Just write us for what you want. We may have it. We also pay top prices for Surplus.

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At A Fraction Of The Original Cost

UNION Rebuilt Machinery
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International Stainless Steel Straightline Vacuum Filler, with Automatic Feeder.
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Chisholm Ryder New Way Model MH Wraparound Labeler.
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Baker Perkins BB, JNM and Readco Heavy Duty 50 to 150 gal. Double Arm Jacketed Mixers, Sigma or Fish Tail Blades.
Day and Robinson 100, 800, 1500, 2000 lbs. Dry Powder Mixers and Sifters.
J. H. Day 35 and 75 gal. Imperial Double Arm Steam Jacketed Mixers.
Day, Ross Pony Mixers; 8 and 15 gal. caps.
B. P. type 3500 gal. S. J. Double Arm Mixer.
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Tri-Colloid 5½" S.S. Mill & Homogenizer.
Mikro 4TH, 3TH, 1SH Pulverizers; Jay Bee, Schutz O'Neill, Stedman Mills.
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Pony ML Labelrites; Ermold, World Semi and Fully Auto. Rotary, Straightaway Labelers.
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S. & S. G1, G2, G6 Auger Fillers.
F. J. Stokes HG8B Duplex Auger Filler.
Whiz Packer Fillers.
Triangle Package Models G2C, G2S, N2CA Elec-Tri-Pak Fillers.
Horix and Elgin S.S. Rotary Fillers.
Filler 4 head S.S. Auto. Piston Filler.
Stokes, Colton Semi Auto. and Auto. Tube Fillers and Closers.
F. J. Stokes 90 D Auto. Tube Filler and Closer, also for jars.
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Consolidated 13" Macaroni Presses.
Battery of Grimolas and Macaroni Mixers.
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318-322 Lafayette Street New York 12, N. Y.

TOP PRICES PAID FOR YOUR SURPLUS EQUIPMENT

—FOR SALE—

1—Sharples Stainless Steel Super D Canter, Model #PN-14.
1—Niagara #200 Filter, Stainless Steel leaves
1—Sparkler, Monel Jacketed Filter, Model #33C26
1—Sperry Hereslte Filter Press, 36" x 36", Plate & Frame, 4 Eye, Closed Delivery.
2—Dovmington Stainless Steel Heat Exchangers, 500 sq. ft. ea.
1—Day Jumbo Jacketed Powder Mixer, 6,000 lbs.
1—Readco Stainless Steel Jacketed Double Arm Mixer, 250 gals. cap., with Sigma Blades.
1—Stainless Steel Mixing Tank, 1000 gals. cap. with 10 HP Nettco drive.
1—1,500 gals. cap. Type 316 Stainless Steel Storage Tanks.

R. GELB & SONS, INC.
UNION, N. J.
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Tanks: Pfaudler 3000 gal. glass lined vert. jktd.
Silent Cutter: Buffalo 70B, 800 lb.
Dryer: 36"x30" double roll atmospheric.
Powder Mixers: 100 to 2000 lb. capacities.
Liquid Fillers: Vacuum and Siphon types.
Screens: Rotex 40x90", Link Belt 24x96" liquid.
Colloid Mill: Premier 3" st. steel, 7½ hp.
Kettles: Stain. Steel, all sizes, new and used.
Filter Presses: 12" and 24".
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Starch Cookers: Lee 300 gal. stainless steel.
Fillers: Geyer, Kiefer, Vitco, M&S., Elgin.
Labelers: New Jersey, World, Knapp, Burt, Ermold.
Dough Mixers: Day, Read, Hobart, Champion.
Cappers: Capem Pneu. Scale, Elgin, U.S.
Vacuum Pans: 6' stain. steel, 5' copper.
Vacuum Pans: 300 gal. Pfaudler glass lined.

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ME

in our WEST COAST stock

M & S # 10 Piston Filler, 6 pockets
Knapp Quick Adj Labeler 8 oz.—No. 10
Kyler Adj. Labeler—No. 10
A-B 2-2½ Cooker and Cooler. 1815-900
A-B 2-2½ Cooker and Cooler. 1196-500
A-B 1-2 Cooker and Cooler. 900-500
A-B 2-2½ Double Deck Exhaust Box 6'x8'
A-B No. 10 Single Deck Exhaust Box 6'8'
Reitz RD-12 Disintegrator 30 HP 3600RPM
Amer. Utensil Tprd. Screw Juice Extractor
Dunkley Rotary Cherry Pitters (3 avail.)
Corn Washer Tapered Reel, 31" x 93" dia.
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Sterling #5A Slicer with strip cutter
Lewis Bean Cutter arranged for 1" cuts
Copper Steam Jacketed Kettle 54"x44"
A-B 6 pocket Syruper and Drainer
A-B # 10 Exhaust Box 350 cans 16" discs
No. 2½ A-B Exhaust Box 575 can—16" discs
No. 2½ Sprague Cooker and Cooler 1400-700
No. 2½ Sprague Cooker and Cooler 400-700
Reid Retort 5'x18', quick opening door
32 Sparkler St. Steel line filters
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Crude Oil
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Dye—other (except Chromes)
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Lime
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Oleic Acid
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Black Liquor
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Sodium Carbonate
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Sour Mash (Distilleries)
Sulfur Chloride
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Sulfuric Acid—25% 80°F.
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WHAT THE NUMBERS MEAN

The number after each item in the list is the number of the page it appears on. Where more than one item is described on a page, prefix capital letters indicate position: L,R,T,B,C (left, right, top, bottom, center). Small letters are used to separate several products described in an advertisement. Capital letters following page numbers identify products and literature described in monthly editorial departments.

The same numbers appear on the postcard in numerical order.

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For Food Plant Employees and Consultants Only

Circle the numbers of the items—editorial or advertising—that interest you. Consult listings above and on following page for the correct number.

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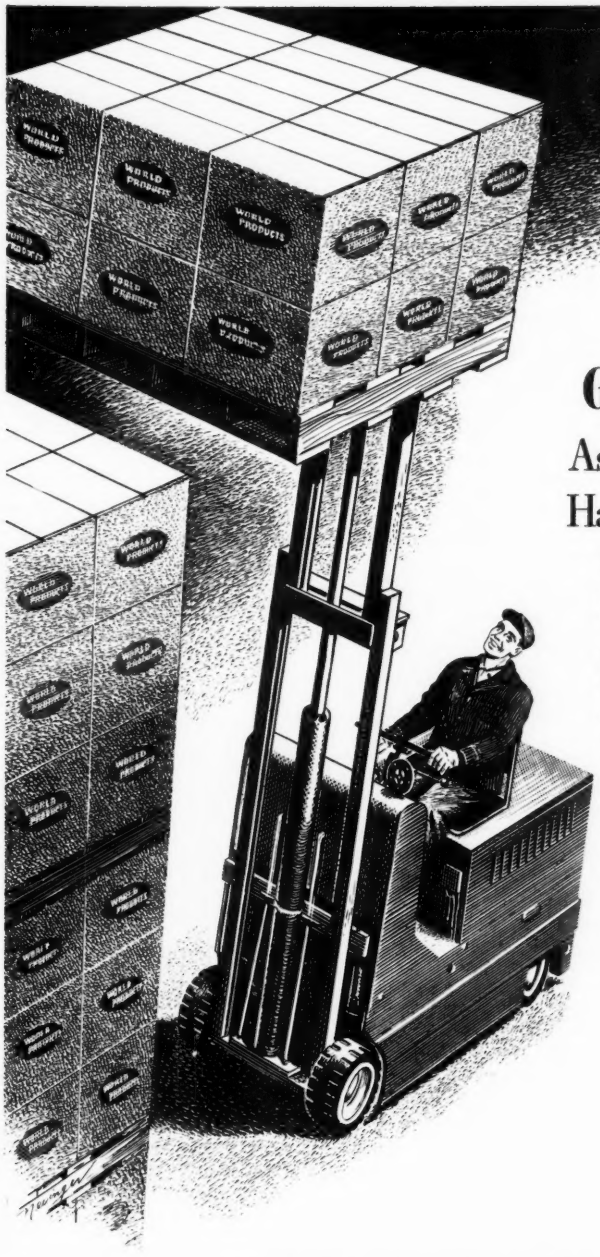

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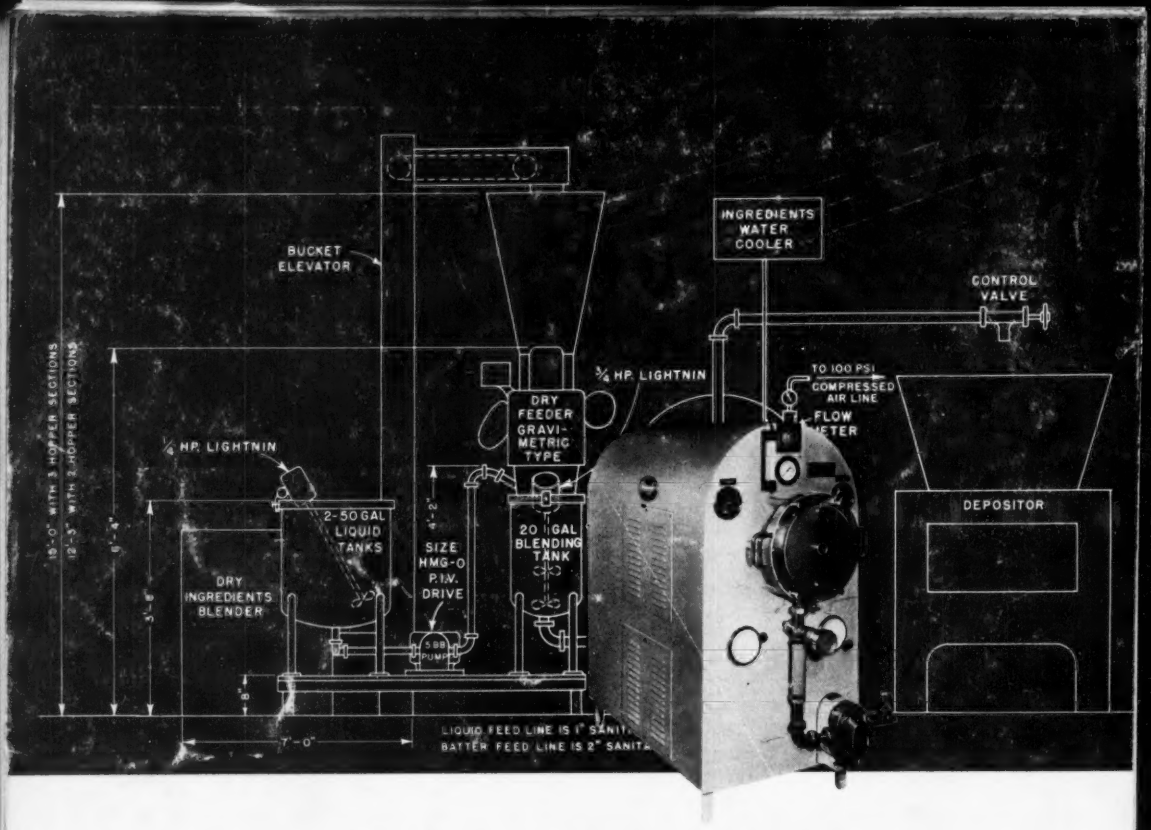

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